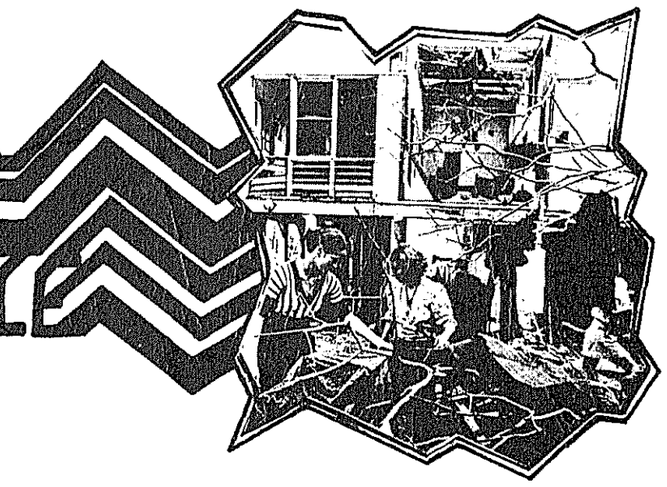
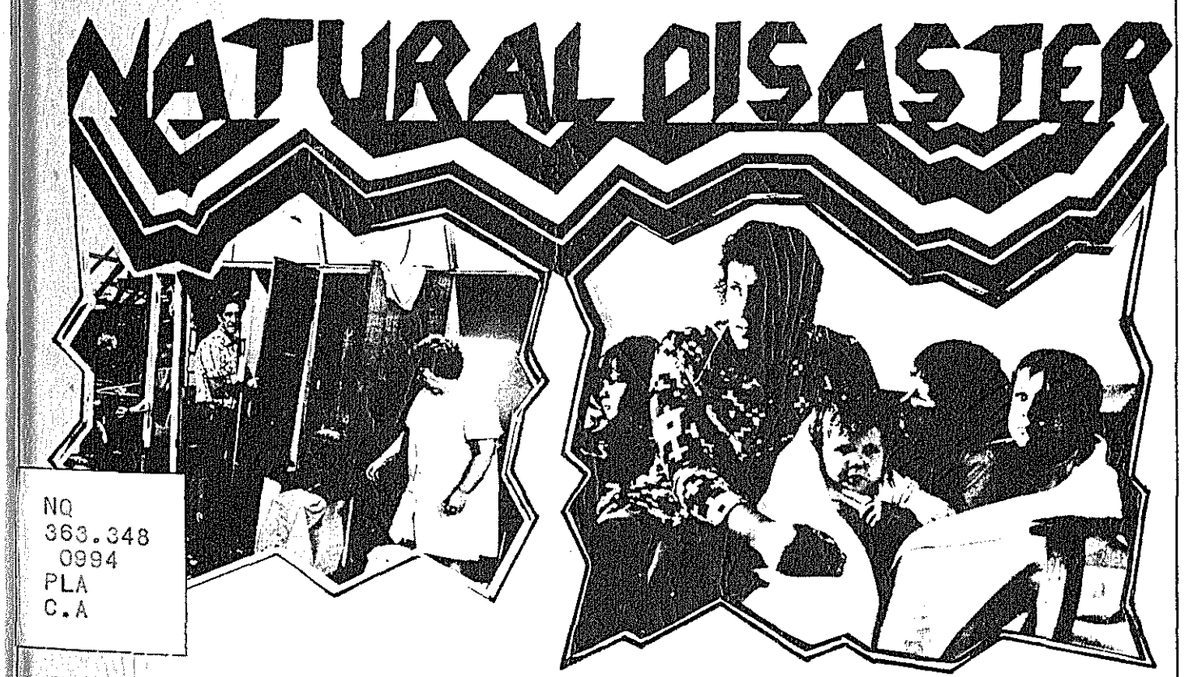
PLANNING FOR PEOPLE IN NATURAL DISASTER — JOAN INNES REID

JAMES COOK UNIVERSITY OF NORTH QUEENSLAND
DEPARTMENT OF BEHAVIOURAL SCIENCES

PLANNING FOR PEOPLE in NATURAL DISASTER





EDITOR: JOAN INNES REID

PLANNING FOR PEOPLE IN NATURAL DISASTER

A Collection of Papers

presented at three public seminars

in Townsville - 1977; Mackay - 1978; Cairns - 1978

North Queensland

and other contributions by

Australian and overseas academic researchers

edited by

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FOREWORD

Since its inception, first as the University College of Townsville, and later as an autonomous institution, James Cook University has followed a policy of giving special emphasis in its research and teaching to problems related to its regional tropical location. Such a policy cannot be followed effectively unless two important criteria are met; first, within the University itself there must be close coordination between the many different disciplines relevant to a particular problem; second, there must be an effective channel of communication between the University and the community, a channel with a two-way flow. Thus, on the one hand, the results of the University's research can be transmitted to and put into effect by the community and, on the other, the needs of the community and its reaction to the academic output can be fed into the University system.

I know of no better example to illustrate these principles than the joint University/Community program in the study of natural disasters. The original Townsville Seminar on Natural Disaster and Community Welfare held in December 1977 was experimental and highly successful. It was refined and repeated in Mackay and Cairns; it was widely acclaimed. It is now clear that its effects will be long-term because the enthusiasm of the organisers and the generous cooperation of the participants has made possible the publication of this volume "Planning for People in Natural Disaster". The final work, which I am sure will become an important reference source for all concerned with natural disasters, has been enhanced by several additional contributions from noted authorities; it is, in every sense, a multi-disciplinary, joint University/Community enterprise.

K.J.C. BACK

VICE-CHANCELLOR

ACKNOWLEDGEMENTS

This volume is the outcome of three regional seminars on natural disaster in relation to the human community, organized in the Department of Behavioural Sciences of James Cook University.

The good public response to the printing of the proceedings of the first seminar has prompted this augmented edition which incorporates the papers delivered at all three North Queensland seminars, plus other papers contributed by academic researchers.

Interwoven in the text are two main strands of current knowledge about natural disaster: one strand representing the field experience of those whose task it is to prepare for and deliver counter-disaster services within their communities. The other strand represents the findings of academic personnel who are presently involved in research in the fields of physics, geography, engineering and behavioural sciences, and who, through the seminars, and now through this volume offer for the benefit of the public the results of their investigations into natural disaster and its impact on community life.

Recapitulating the spirit of the seminars, this collection of papers reflects the whole exercise as a socially-oriented, multi-disciplinary approach to a theme of high relevance to northern Australia - community crises precipitated by fierce physical phenomena. The variety of professional and practitioner viewpoints ensures a broad spectrum of comment on natural disaster, focussing on the tropical northern half of this continent. The regional content has been enhanced by the international perspectives of the Australian scene drawn by Professor J.E. Minor of Texas, and Professor J. Scanlon of Ottawa.

The successful conduct of the three seminars, the initial publication, *Natural Disaster & Community Welfare*, and this volume, are due to the co-operation of many:- Professor K.J.C. Back, Vice-Chancellor of James Cook University for his endorsement of, and attendance at the seminars, and his Foreword to this publication; Professor D.H. Trollope, Deputy Vice Chancellor, for his recognition of the initial seminar as a significant public service, and his sense of community in extending the community seminar to the regions by combining a university research group with a component of local field personnel; Professor J. Oliver, Head of Geography Department, for his pre-existing and sustained interest in natural hazards and his consultations in planning the seminars; Professor G.E. Kearney, Head of Behavioural Sciences Department, for his moral support, participation in the Cairns Seminar, and his Epilogue to this book.

Professor K.P. Stark, Head of Systems and Civil Engineering and his research staff have highlighted the vexatious community problems of cyclone, surge, and environmental safety. The papers by colleagues in the Department of Behavioural Sciences have drawn attention to crucial psychosocial issues.

From community spokesmen came a set of vital discussion papers on prevailing counter-disaster strategies, and unresolved existential problems at the field level, as perceived by state emergency service operations officers, medical administrators and practitioners, communications men, and social welfare personnel.

The Herald and Weekly Times of Melbourne, through the good offices of their Photographic Manager, Mr. Lloyd Brown, generously supplied the Darwin photographs depicting the destructiveness and human distress associated with Cyclone Tracy.

The editor also thanks Mr. F. Daveson of Administrative Services for his considerable technical assistance in preparing this manuscript; Mrs. L.J. Laivins and Miss J. Niven for their patient typesetting, and Mr. A. Trovalusci of James Cook University Printery.

The contributions to this publication reaffirm the interdependence of the community with its need to have access to the best of scientific and practical knowledge for dealing with its corporate emergencies, and the university as a centre for research, discovery, and the dessimination of learning about humans and their environments.

Joan Innes Ried
Editor

May 10, 1979

INTRODUCTION

INTRODUCTION

D.H. TROLLOPE
DEPUTY VICE-CHANCELLOR

It is a matter of considerable satisfaction to be asked to write an introduction to this most comprehensive collection of papers and contributions on 'Planning for People in Natural Disasters'.

When, early in 1972, I was deeply involved with the survey and evaluation of the effects of 'Althea' on Townsville, the suggestion was made that, as well as investigating the physical aspects of building damage and storm surges, we should be paying attention to th socio-economic and psychological impacts on people. Indeed the point was made that natural hazards only became disasters inasmuch as they effect the lives of a significant number of people, their concerns and their possessions. While, however, it was readily possible to organize a number of architects and engineers to conduct the physical surveys, behavioral scientists were not available to conduct the human surveys.

It was with this in mind that the following recommendation was made in the report on 'Althea' (Trollope 1972, Part II.):

> *(1.3.9) The establishment of a cyclone research facility in North Queensland is seen as a pressing need. Such a facility should co-ordinate all aspects of investigations into cyclone behaviour and the effects on people, buildings and general development.*

Since that time one of the more significant developments within the University has been the establishment of the Department of Behavioural Sciences in 1974, which includes a social work programme.

The holding of the first seminar on 'Natural Disaster and Community Welfare' in Townsville in December 1977 met with enthusiastic support and was successfully repeated in Mackay and Cairns early in 1978. This was a direct result of the academic development in Behavioural Sciences, and much credit is due to Mrs. Joan Innes-Reid for her initiative in organising the Seminars.

Also, in the intervening period, Professor Oliver, Head of the Department of Geography, who had been a member of the original Cyclone 'Althea' investigating panel, had introduced the broader concept of Natural Hazards, and his influence contributed greatly to the increasing attention that was given to socio-economic aspects of disaster problems.

On the Engineering side considerable advances had been made with the development of the sophisticated SURGE prediction model by Professor Stark and Dr. Sobey; the structural evaluation and design approach to domestic structures by Associate Professor Walker and the boundary layer wind tunnel studies by Dr. Holmes.

Another important step was the establishment of the James Cook Cyclone Structural Testing Station with funds contributed by industry and the appointment of the Technical Director, Mr. Reardon.

It became obvious that the University, with the support of the Queensland Government, the Australian Housing Research Council and private industry, had gone a long way towards meeting the recommendation (1.3.9) referred to above, and the need was felt to establish a co-ordinating group to foster further developments of a multi-disciplinary nature.

Thus was born in mid 1978 the Natural Disaster Research Group comprising:

Professor G.E. Kearney	:	Department of Behavioural Sciences
Professor J. Oliver	:	Department of Geography
Professor K.P. Stark	:	Department of Civil & Systems Engineering
Professor D.H. Trollope	:	(Chairman).

But it was to have a very short life It soon became obvious, as a result of increasing national and international interest in disaster research and investigation, that more than co-ordination of existing efforts was needed.

In December 1978 the Vice-Chancellor, Professor K.J.C. Back, approved the establishment of the Centre for Disaster Studies within the University. The function of the Centre is to:

(i) encourage and promote interdisciplinary research in the field of disaster mitigation;

(ii) provide a post-disaster investigation team in the event of a disaster and establish and maintain links with the appropriate bodies for its effective operation;

(iii) provide an information service to the community on disaster mitigation measures through newsletters, publications and educational programmes;

(iv) develop and maintain links with other organisations and institutions both in Australia and overseas involved in disaster mitigation activities;

(v) co-ordinate disaster related consultancies involving multi-disciplinary studies.

Initially the Centre is to be managed by the original Natural Disaster Research Group with Associate Professor Walker as Secretary, and some twelve members of the academic staff of the University are active contributors to the work of the Centre.

As this is being written the first formal activity of the Centre has been initiated with a five member team:

Dr. R.E. Volker	(Civil Engineering)
Dr. J.P. Reser	(Psychology)
Mrs. J. Innes-Reid	(Social Work)
Mr. N. Power	(Civil Engineering - Post Graduate Student)
Mrs. R. Orr	(Social Work - Undergraduate Student)

having gone to Cairns to study, in collaboration with the State Emergency Service, the impact of flooding following Cyclone 'Peter'.

With the wealth of experience and expertise already available and the potential for further rapid development the Centre is well situated to assume a major role in hazard and disaster studies at a national and international level.

Before concluding this introduction there are two aspects of communication and planning to which I should like to draw attention.

The Role of Classification in Communication:

From the point of view of community impact there are three principal factors in cyclone behaviour. These are maximum wind velocities, storm surge and rainfall.

The maximum wind velocity and associated storm surge are interrelated to some degree in that maximum surges are likely to occur with fastest winds as the latter are in turn related to the minimum barometric pressure. On the other hand there does not appear to be a close correspondence between maximum wind velocity and rainfall. It is desirable, therefore, to treat them separately, and this gives rise to the concept of the Wind Index (WI) and the Rainfall Index (RI).

The maximum wind velocity in a cyclone may vary from 'mild', in which case it is lower than that likely to be experienced in storms in temperate and sub-tropical latitudes, to 'very severe' where the maximum wind velocities are comparable with those in tornadoes.

Clearly it is of considerable practical importance to know as far as possible in advance the likely severity of the cyclone.

As far as potential damage to buildings is concerned it is not the actual wind velocity that is critical but the dynamic pressure associated with the wind. Thus a convenient Wind Index Scale would be one in which each interval represented the same increase in dynamic pressure and, therefore, damage potential.

In the Australian Standard Wind Code (AS1170), the relationship between pressure (q_z) and velocity (V_z(m/s)) is given as:

$$q_z = 0.6\, V_z^2 \times 10^{-3} \text{ kilopascals.}$$

This indicates that if the wind velocity doubles the pressure is increased four times - the pressure varies as the square of the velocity.

It so happens that an interval of q_z of 0.6 kilopascals corresponds to a velocity interval of 1000 $(m/s)^2$ and this is convenient for classification purposes.

The resulting classification is:

WI	Wind Velocities m/s	Wind Pressures Kilopascals
0	<15	< 0.14
1	15 - 32	0.14 - 0.60
2	33 - 45	0.61 - 1.20
3	46 - 55	1.21 - 1.80
4	56 - 63	1.81 - 2.40
5	64 - 71	2.41 - 3.00
6	72 - 78	3.01 - 3.60
7	79 - 84	3.61 - 4.20
8	85 - 90	4.21 - 4.80
9	91 - 95	4.81 - 5.40
10	96 - 100	5.41 - 6.00
11	101 - 105	6.01 - 6.60
12	106 - 110	6.61 - 7.20
↓	↓	↓

Table 1: Wind Velocity and Wind Pressure Indices for Cyclones.

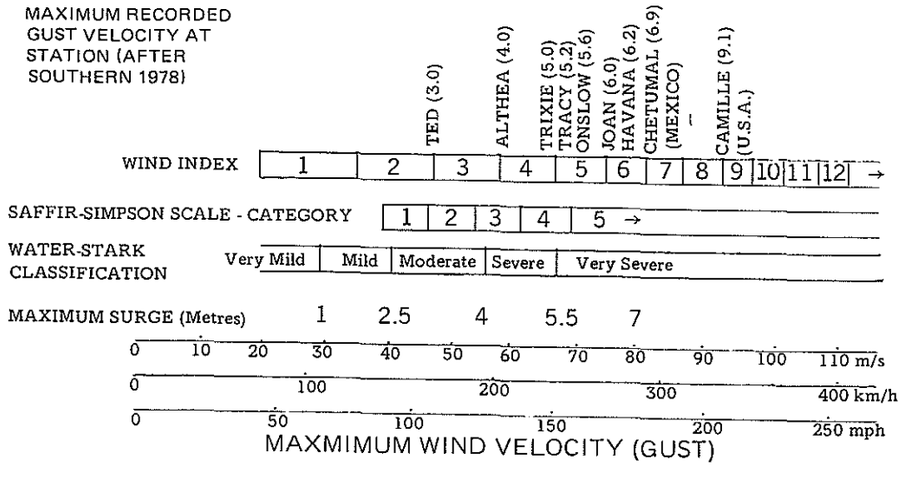

FIGURE 1

The principle that has been adopted is similar to that used in earthquake studies with the Richter scale which uses a numerical index to indicate the severity of the earthquake shock.

Figure 1 shows the Wind Index scale compared with that suggested by Saffir and Simpson (1977), which has been recently adopted by the National Weather Service in the United States, and also with that suggested recently by Walker and Stark (1978).

Also plotted are some representative values of maximum wind velocities associated with cyclones that have been either measured or estimated.

Figure 2 shows the relationship between the Wind Index and the likely maximum storm surge given by Walker and Stark (1978).

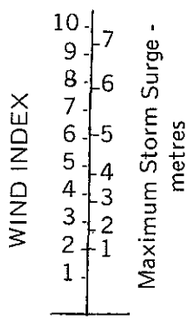

FIGURE 2

The Rainfall Index (RI), although more difficult to predict for a given cyclone, is from the classification point simpler in that it is the total quantity that is significant. An interval of 40 mm has been taken so that the scale becomes:

Rainfall Index	Range of Precipitation mm
1	< 40
2	41 - 80
3	81 - 120
4	121 - 160
5	161 - 200
6	201 - 240
7	241 - 280
8	281 - 320
9	321 - 360
10	361 - 400
↓	↓

Table 11: Rainfall Indicies for Cyclones.

The intention is that each cyclone should be classified in terms of two indices:

Cyclone Classification = WI - RI.

Two well known examples of cyclones classified in this way are 'Althea', which with a wind velocity of 55 m/s and a rainfall of 147 mm would be classed as a 3.9-4 cyclone, whereas 'Tracy', with a wind velocity of 65 m/s and an estimated rainfall of 277 mm, would be a 5.2-7 cyclone.

p-Triage and Planning:

One of the most serious and most difficult problems in areas subjected to cyclonic storms - and indeed any area subject to inundation - is the question of evacuation of low-lying areas in the path of a tidal surge. The situation is acute during cyclones because of the associated maximum velocity winds and high rainfall which occur in the period prior to the arrival of the surge, and the higher the surge the higher the wind velocity. There is a threshold velocity at which movement of people, and indeed of vehicles, becomes impracticable. For elderly people it is clear that at about 35-40 m/s (gust velocities) movement is extremely difficult if not impossible. Whatever the value is it will be constant and independent of the Wind Index (WI) of the storm. Thus it is likely that the decision to evacuate will have to be made much earlier for high index storms, and the difficulties are compounded if this occurs during the night.

A recent article by Dr. K. Jones (1978) has drawn attention to a well established principle embraced by the medical profession in times of disaster. It dates from the period of the Napoleonic Wars and is called triage. The procedure is thought to have been introduced by one of Napoleon's military surgeons and entails the sorting of casualties for priority of attention. It is a very civilised and sophisticated concept and recognises that all things cannot be done at the same time. Resources, needs and potential vary according to time and the people involved.

Jones points out that when the concept of triage is married with the well known dictum of Jeremy Bentham, an English reformist during the Industrial Revolution, the definition becomes 'the sorting of casualties into priorities for evacuation and for treatment so as to achieve the greatest good for the greatest number'. The point of this contribution is to urge the adoption of the principle **before** not after the event.

There are enormous logistic problems involved. Not the least, as yet, is the unknown capacity of the road system to permit evacuation. It is for this reason that it has been called p-Triage, with the prefix 'p' emphasising the pre or planning content of the procedure.

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THE CHALLENGE OF NATURAL DISASTERS

John Oliver

This talk deals with the challenges of natural disasters. It sets out to demonstrate that a real challenge exists, something we must be aware of and something we must respond to.

General considerations

1. It has been the experience the world over that those communities that are located in disaster prone areas have become more vulnerable to the effects of disasters. The population has increased, urbanisation has grown, there has been more capital development at risk. Although our sophisticated systems of daily life should protect us from these threats, once those sophisticated systems are broken then we find that we are often in worse difficulties than perhaps if we had a simpler life style. The other thing we become aware of as we survey the world, or even different parts of Queensland, is that some areas are more hazard prone than others.

2. The second point I would want to make is a general viewpoint that the way we assess and how we respond to a natural hazard depends on our awareness and our perception of the danger. The man in the street, or the expert, or the administrator, each may well have very different perceptions of what the threat is and how we should deal with it. Experience of a natural disaster may clearly sharpen our understanding, but we must remember in North Queensland, and that includes far North Queensland, the population is mobile. The many newcomers who have contributed to the increasing and rapidly developing population numbers have little or very different sorts of experiences of the challenges of a natural disaster.

3. Thirdly, what is a natural disaster? One can use a variety of descriptive definitions. Whether they convey much is another matter. A natural hazard is a natural event of geophysical or meteorological origin. This may not tell us very much perhaps, but we may understand more if we detail some of its characteristics. It usually has a sudden onset though there is an exception in the case of drought. Its particular time of occurrence is unexpected. We must expect tropical cyclones in North Queensland, but we do not know exactly when they are going to occur, we may have a very quiet season, like the last one, or a very much more active one.

4. The magnitude of a natural hazard, and this is the crucial point in the definition, exceeds the capacity of the community or the organisation to deal effectively with the damage and the disruption without taking special actions, and often we discover, requiring additional help. If we look at the experiences of far North Queensland, in

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Professor John Oliver: *BA PhD Brist FRGS FR Mets*

1971 Appointed Foundation Professor of Geography, James Cook University. As a climatologist and with experience in a number of tropical lands developed an awareness of the problems of environmental stresses on man's activities. This resulted in a direct interest in the character and impact of natural disasters and in the planning for the problems they cause. First direct association was with a natural disaster in Australia was Cyclone Althea. Member of the Cyclone Althea Advisory Panel of James Cook University. Listed as meteorological consultant to the James Cook University Structural Testing Station. Member of the Australian Academy of Science Organizing Committee for the May 1976 Symposium on Natural Hazards in Australia (Canberra). Member of the Editorial Committee of the book to be published on the same topic.

terms of its natural environment, we find fortunately, that it is not an unduly hazardous area. It is exposed only to some of the forms of natural hazards, the worst of which is the tropical cyclone.

5. A tropical cyclone is a complex hazard and at various stages during the next two days in this seminar, details of the nature of the cyclone hazard will be referred to in more detail. Here I will merely mention the general headings. It produces a risk of major flooding which may arise either from heavy rainfall and the increase of the discharge of the rivers, or from the marine, coastal region storm surge. The effects of high velocity winds, either sustained over periods or gusting, and the problems of erosion, either of soil or coastal regions, may be other forms of damage.

6. In addition to the tropical cyclone as the most obvious environmental hazard there are other challenges which tend to be more localised in this area but can still be very severe. Wind damage due to other meteorological phenomena such as thunder storms, squalls, and even small tornadoes must be reckoned with. It must be noted that there is a clear difference between the tornado and cyclone. Far North Queensland is not free from the risk of small tornadoes. Thunder storm downpours and heavy monsoon rain can also produce severe flooding.

There are other localised phenomena, which sometimes become a serious problem for local communities such as landslips, lightning. A widely distributed problem, but less severe in this part of northern Queensland, may be drought. Drought is more a feature of the inland and the south west of the State. Bushfires which depend on sufficient material to burn in association with dry, hot conditions are also more often a threat away from the wetter coastal fringe. Fortunately North Queensland is outside the main earthquake zones of Australia, although we are at the northern extremities of such zones. An earthquake is an unlikely but not impossible occurrence.

Dealing with tropical cyclone threats

These are the sorts of challenges we must be aware of. What special actions, and I emphasise 'special', need we take? We can aim at prevention, we can aim at mitigation or we can aim at avoidance. When we are in the midst of the emergency we are faced with the problems of search and rescue, and, after the event has occurred, we are concerned with the shorter term problem of restoration, trying to put things back into moderate working order and then finally with the longer term problem of recovery or reconstruction.

I want to concentrate on the stages of planning for disaster since these bear much more significantly on the social problems. The emphasis clearly varies with different situations, different types of hazards, their probable frequency and their probable severity. Our attention is focused primarily on tropical cyclones.

Planning stages

1. *Pre-disaster*

We can consider first a *pre-disaster phase*. There are certain actions we can take in the pre-disaster stage if we consider we are in the disaster area, or a potential disaster area.

1.1. First of all we can try to produce an inventory of the sorts of risk that are associated with tropical cyclones. There are a number of questions requiring an answer. How do tropical cyclones develop and how do they behave in our particular area? How often can we expect them to occur in the Cairns area or on the coastal sections to the north or to the south? There appears to be quite a difference in the probability of such events along the coast.

1.2. When we know how cyclonic storms will behave, we want to establish a warning system; one that is efficient and one that is understood by those living in the area. It is particularly important that a warning message is informative. Not only must we understand it, but we must get the right sort of answers from its information to enable us to take the appropriate actions.

On the one hand we have got to avoid alarming the community, on the other hand it is most essential that we do not develop a feeling of complacency in the community in the disaster prone area. We may well err in being over cautious over warnings.

1.3. In this pre-disaster phase we can also consider the prospects of weather engineering. By this, we are thinking of the possibility of changing the seriousness of the cyclonic threat. Can we modify the intensity of a tropical cyclone? Can we steer it away from areas where damage will be most serious into other areas in which, hopefully, it will cause little damage. This is something which scientists are looking at. As a planning prospect in the northern parts of Queensland it is a possibility for the future but not an idea of practical significance at this time.

1.4. We can consider spreading the damage costs. This obviously implies insurance cover, but all we do is spread the cost of damage caused by the disaster across a wider section of the community. Insurance does not eliminate the cost. Unless there are inducements to those who take out insurance cover to encourage them to adopt risk avoiding or risk reducing actions, some will find themselves paying the bill for the others.

1.5. Mitigation, by the application of engineering skills, if we are prepared to pay the bill, involves the strengthening of buildings, bridges, harbours, rivers and sea coast defences. We can also build dams to hold flood waters. We can encourage or even direct this action through the drawing up of building codes.

There is a critical balance between the cost of action and the cost of the damage, which would occur if we took no action. We have also got to ensure that some sections of the community do not benefit from a bill that is charged to a whole community. Perhaps the best example of this is when, after the building of a dam, the flood plain below the dam is occupied. The people who benefit from the overall expenditure are those who can initially occupy the sites below the dam. They will not by any means have had to pay the full costs.

1.6. In this pre-disaster phase we can also consider the avoidance of the dangers. Avoidance covers a variety of strategies. We can avoid building in a surge or flood risk area, and we can encourage that avoidance by land zoning regulations, by taxation penalities or incentives or by insurance. This is something which is a long term response, because, in thinking of an occupied area, it is unlikely that by a stroke of the pen we can remove everyone from the risk area.

On the other hand on a shorter term basis we can evacuate people from the high risk areas when we receive notice of the warning and before the danger is upon us. This only saves people, it does not save property. It carries with it some fairly dramatic challenges. A high level of organisation is needed and particularly as some of you in voluntary organisations will fully appreciate, the importance of record-keeping is very great. We must know where the people go, if they are evacuated, and we must ascertain if a family is together or split up. If we do not have an efficient organisation, then evacuation is a potential source of major hardship and even danger. It could in fact be as bad as the disaster itself if the whole evacuation system collapsed.

2. *Emergency*

We can now come to the *emergency phase*, the time when the event actually occurs and the immediate days afterwards.

2.1. During the cyclonic storm itself there is little that can be done. It is dangerous for rescuers and emergency workers, police or others to go out during the storm. It is likely to cause as much hardship to them as to those we may hope to be able to rescue. So there is little that can be done for a short period which may usually be only for a few hours, but may be longer since tropical cyclones can affect areas at a dangerous level for as long as 24 hours. So we must not assume that all tropical storms pass over in an hour or two.

2.2. Once the storm permits, the State Emergency Services and the Police in particular have the job of rehabilitating the basic public services, the power, light, water,

INVENTORY OF CYCLONES

Inventory of cyclones crossing the coast (sea to land or land to sea) July 1909 to June 1975 indicating date of crossing, lowest central pressure recorded during the life of the storm (where known), direction of forward movement.

Gulf of Carpentaria — Groote Eylandt to Cape York			East coast — Cape York to Cape Capricorn		
Date	Central pressure mb	Direction of movement Degrees from north	Date	Central pressure mb	Direction of movement Degrees from north
5.1.1911	996	195	27.1.1910	--	210
18.3.1911	--	310	29.1.1910	--	115
21.1.1913	--	095	10.2.1911	--	110
1.2.1913	--	275	12.2.1911	--	190
2.2.1913	--	275	17.3.1911	--	215
9.1.1921	--	255	8.1.1913	--	070
2.4.1921	--	225	22.1.1913	--	100
4.4.1921	--	180	30.1.1913	985	270
28.3.1923	--	255	27.12.1916	994	245
31.3.1923	--	235	15.12.1917	--	210
27.2.1925	--	275	15.12.1917	--	105
12.2.1927	--	340	20.1.1918	940	235
26.2.1929	--	280	10.3.1918	988	245
27.2.1929	--	270	3.2.1920	988	245
19.3.1945	1000	275	1.4.1921	982	230
10.2.1946	--	290	6.4.1921	--	120
12.2.1946	1000	270	28.3.1923	994	255
6.1.1948	--	110	26.2.1925	--	255
12.1.1948	--	130	19.6.1925	999	215
21.2.1948	--	125	10.2.1927	--	250
23.2.1948	996	200	26.2.1929	--	235
12.2.1949	--	260	27.2.1929	--	105
13.2.1949	--	180	31.1.1945	--	230
15.1.1950	--	165	1.2.1945	--	110
21.1.1951	995	180	6.3.1945	997	110
20.1.1952	--	130	18.3.1945	1000	275
13.1.1953	--	200	19.1.1946	--	210
15.4.1953	1003	240	9.2.1946	996	235
16.1.1956	994	185	2.3.1946	982	240
21.12.1956	982	120	3.3.1946	--	145
1.2.1957	1003	115	4.2.1947	--	220
15.4.1958	990	235	5.2.1947	--	065
15.1.1959	992	035	11.2.1947	--	205
19.1.1959	995	070	6.1.1948	--	110

Gulf of Carpentaria — Groote Eylandt to Cape York			East coast — Cape York to Cape Capricorn		
Date	Central pressure mb	Direction of movement Degrees from north	Date	Central pressure mb	Direction of movement Degrees from north
25.12.1959	988	095	13.1.1948	--	080
26.12.1959	986	130	10.1.1949	996	115
20.3.1960	1002	270	11.2.1949	995	230
22.3.1960	1003	270	16.2.1949	--	125
3.3.1961	988	110	6.3.1950	--	270
19.2.1962	999	090	8.3.1950	--	085
7.1.1964 (Audrey)	999	180	10.3.1950	--	285
11.1.1964(Audrey)	983	225	3.1.1954	--	115
4.12.1964(Flora)	996	120	7.2.1954	990	180
5.12.1964(Flora)	992	110	7.3.1955	965	240
14.1.1965	998	105	20.1.1956	1000	360
27.1.1965(Judy)	1002	105	6.3.1956	961	275
29.1.1965(Judy)	996	130	2.2.1957	1001	110
15.3.1967(Cynthia)	994	335	1.4.1958	968	250
19.3.1967(Cynthia)	1002	235	20.1.1959	985	125
28.1.1968(Dixie)	986	225	16.2.1959	948	175
21.2.1968(Bonnie)	1004	265	28.12.1959	997	095
11.2.1970(Dawn)	994	070	20.3.1960	1002	270
18.3.1970(Cindy)	995	255	3.3.1961	--	115
19.3.1970(Cindy)	1000	035	6.12.1964(Flora)	996	110
3.2.1971(Aggie)	986	275	14.1.1965	1000	105
19.2.1971(Fiona)	960	140	30.1.1965(Judy)	997	075
7.1.1972(Bronwyn)	996	125	18.1.1970(Ada)	962	205
13.4.1972(Faith)	997	115	11.2.1970(Dawn)	994	075
29.1.1973(Adeline)	970	205	16.2.1971(Gertie)	988	295
1.3.1973(Leah)	996	260	21.2.1971(Fiona)	995	110
5.3.1973(Madge)	996	270	24.12.1971(Althea)	952	230
6.3.1973(Madge)	--	290	14.4.1972(Faith)	1002	095
25.3.1973(Bella)	1002	190	4.3.1973(Madge)	997	265
11.2.1974(Yvonne)	1000	285	19.12.1973(Una)	988	175
14.2.1974(Yvonne)	995	225	10.2.1974(Yvonne)	995	280

(Lourensz, 1977) (see Bibliography)

Note: The above list does not represent individual cyclones. In a number of cases cyclones moved out to sea and crossed the coast again elsewhere. Some cyclones moved from one region to another. Where they stayed within a region and crossed the coast more than once the name is repeated.

food supplies, medical services, road clearance and so forth. They have the responsibility of ensuring appropriate public health measures, disposal of corpses, more frequently the disposal of rotting food, which are particular problems in the high temperatures of the tropics. Many sorts of health controls are urgent needs following disaster. Emergency repair of roofs and windows must be undertaken quickly because it is surprising how large a proportion of the damage caused by a tropical cyclone is due to the rain that penetrates through damaged roofs or broken windows in the immediate post-cyclone hours. Wetness rapidly causes deterioration of interior goods and furniture.

2.3. In this emergency phase too, social services have to gear up to meet special needs to assist particularly vulnerable sections of the community, perhaps the aged, the young, the incapacitated, the bereaved. They may have to provide, at rapid notice, emergency sources of finances, including ensuring continuing payments of pensions and welfare payments. Also in this emergency phase, it is vitally important that up to date, reliable information should be provided to the public at all times. People are divorced from their normal sources of information. To ensure the minimum disruption, full and up-to-date information is critical. This needs careful thought as to how it can be got over. Reliability is most crucial.

2.4. Should there be the need to evacuate, one hopes that it only applies to a particular section of the community, although, as you will be told later on, there is a very large area of Cairns which is potentially at risk for storm surges. If you have to move thousands of people, it is obvious there will be problems and difficulties in doing it in a matter of hours, without extraordinary difficulties arising and without major problems in reception areas. In the case of the Cairns area the problem of early flooding of escape routes is a particularly difficult one.

3. *Post-disaster*

Our next phase is the *post-disaster* phase. In terms of this particular seminar, which is oriented towards community welfare problems, this phase can be subdivided into two — the restoration and the recovery stages. The two stages together can last a surprising length of time.

3.1. Experience of cities elsewhere in the world has shown that to the end of the reconstruction phase, after major disasters, has lasted anywhere between two and perhaps eight, or even ten years. So some of the aspects considered here are of a long-term planning nature. It is interesting that in the Darwin experience, with an enormous input of money and effort, the task has taken about three years. After about five or eight days following the disaster, the State Emergency Service generally anticipates that it will hand over to the normal local, state and federal agencies. The State Emergency Service is there for the emergency primarily. The other official and voluntary organisations exist as part of the natural community services and they are then called upon to deal with the normal day-to-day problems, plus the addition of the problems arising from the disaster. Obviously physical restoration of buildings etc goes on, but the social welfare problems, I am suggesting, take on at this stage an increasing importance.

3.2. If we look at this post-disaster phase, I think we can divide it into two different parts. We might think first of all of restoration, that is, putting the community back into working order. This from experience elsewhere in disaster situations seems to take about ten times as long as the emergency phase, something like 50-70 days.

3.3. After that there is the recovery or reconstruction phase which lasts perhaps the two years or so, but in especially difficult situations, or in different sorts of community, it might take longer. But in this longer recovery stage we are trying to return the community to its pre-disaster state, or ideally to improve upon the pre-disaster state. As the restoration and recovery stages progress, the administrative machines become less flexible.

In the emergency we can manage to draw a line through rules. We can get down to doing the job quickly, without being constrained by the rule book. As the time

elapses, administration and the demands of bureaucracy become more constraining. Officials inevitably feel more answerable to authority. This is something to bear in mind very closely in considering planning problems. It is the time too, if they are going to develop, when tensions between officialdom and voluntary bodies may surface. Each group may think that they have a better answer than the other.

3.4. Let me briefly look at the problems. Some difficulties occur in the early stages, some persist through the much longer period even lasting over years. More immediate are the needs to advise people in the community how to deal with the problems of insurance claims, and building permits for repairs with mortgages on damaged properties, or questions of rebuilding. When a property is under-insured obviously insurance payments will not meet the rebuilding outlay and severe hardships may arise.

3.5. It is inevitable, if a major disaster affects a community, that the normal patterns of life will be disturbed. Shops are damaged, the patterns of shopping are upset, people may have to travel to changed places of work by different routes, involving different costs. Recreation opportunities are interrupted, opportunities perhaps to go to church are interrupted, community programmes are interrupted. There are additional costs, disturbances to the normal routine, and we find it quite possible that social groups get split up and lose their identity. In the urgency to re-house people, it often is unavoidable that those of rather unlike inclinations and interests and outlooks have to be put together. Whilst it is accepted for a short time, increasingly it becomes a problem over a long time. If there has been a very serious disruption of the community life, the city or town may lose a significant part of its income, thus presenting a difficult situation for the city administrators.

3.6. There is the problem of what is called the post-disaster shock. This will be referred to later in the seminar and I shall refrain from comment, except to say that psychological disturbances are sometimes attributed to the stresses or disruption of the daily patterns of life and the actual experience of the disaster. It becomes important to identify risk groups. I emphasise they are only a small proportion of the population but again the aged, the young and others prone to stress situations are going to need special care and need to be clearly identified. For example, marital problems if they exist may be accentuated. A family with several young children may be especially vulnerable particularly over a short term if the cyclone has destroyed their resources. It has been suggested that the unskilled, and the less skilled are the most likely to suffer from the disruption that occurs following a serious disaster.

Experience, and we must learn from experiences elsewhere in the world, suggests that material recovery comes more quickly than other forms of recovery. The problems for the individual and for the family, the problems for the community, remain as social problems even after, superficially, material things seem to be put right. People may have returned to their houses, furniture is restored and superficially conditions are apparently almost back to normal, but psychological tensions may persist. The family it seems shows more resilience than some of its individual members. Those who have studied the problem suggest that, in some instances, residual psychological consequences may persist for as long as two years or so after the disaster.

3.7 When we are thinking of recovery there is the opportunity for improvements to be incorporated in the restoration of the community's resources. If we are thinking of urban renewal, and improvements of parts of the city, then it is possible to slip these in if we think of them well enough ahead when recovery from the disturbance and damage caused by the disaster is taking place. There is inevitably a conflict between the speed to get things done and return to normal on the one hand and the need to plan carefully and perhaps consider alternatives on the best recovery strategy on the other hand. Out of such different viewpoints comes bitterness. A feeling sometimes develops amongst members of the community that the experts and professionals, especially if they come from outside, are taking over and dominating the recovery planning.

3.8 There is a serious problem associated with the return of evacuees to devastated areas. At the time of evacuation people tend to be ushered out of threatened areas

MAJOR CYCLONIC STORM SURGES IN NORTH-EAST AUSTRALIA

Date	Location	Surge (meters)	Lives lost
1884 Jan 30	Bowen	3.05	
1896 Jan 26	Townsville	1.80	18
1899 Mar 5	Bathurst Bay	12.2*	307
1918 Jan 21	Mackay	3.66	30
1918 Mar 9	Innisfail	3.01	1
1920 Feb 2	Cairns	1.21	
1923 Mar 28	Groote Eylandt	7.01	
1934 Mar 11	Port Douglas	1.85	75
1948 Feb	Bentinck Island	3.66	
1949 Mar 2	Gladstone	1.52	4
1956 Mar 6	Mackay	1.40	4
1958 Apr 1	Bowen	1.51	2
1964 Jan 13	Karumba	1.52	
1964 Feb 4	Edward River Mission	5.48	
1971 Feb 19	Edward River Mission	4.57	
1971 Dec 24	Townsville (Toolakea)	3.66	2
1976 Jan 20	Yeppoon	1.00	

(Harvey, 1974)

* Evidence does not permit this to be confirmed with complete confidence. The death toll was caused by loss of the pearling luggers at sea.

TROPICAL CYCLONE CROSSINGS

Crossings of the coast by tropical cyclones over the period July 1909 to June 1975. Sections are over 100 km stretches of the coast from Cape York southwards.

Section	Place with section	Crossing sea to land	Crossing land to sea	Total crossings
1	Cape York	1	2	3
2		0	1	1
3		1	1	2
4	Lockhart	2	4	6
5		2	0	2
6		1	0	1
7		3	0	3
8	Cooktown	1	3	4
9		12	3	15
10	Cairns	4	2	6
11		5	1	6
12		3	4	7
13	Townsville	5	1	6
14	Bowen	1	0	1
15		4	2	6
16	Mackay	3	2	5
17	St. Lawrence	4	1	5
18		5	0	5
19	Yeppoon	0	4	4
			Total	88

(Lourensz, 1977) (see Bibliography)

Note: A tropical cyclone is here defined as a synoptic low pressure system with which mean wind speeds sustained over a 10 minute period attain at least 63 km/h are associated. Not all such storms will be equally destructive.

quickly. They do not know when they can get back. Sometimes the problem of them getting back is a very real one and this too may become a source of a great deal of unhappiness or bitterness. People want to get back as soon as they can, but it may be very undesirable to let them back too early otherwise they can impeded restoration.

In the United States, where a great deal of work has been done on disaster planning, it is claimed that the reconstruction phase is that which is most neglected. Perhaps, here also, although we are rapidly righting the situation, from the community welfare point of view, more attention is needed. Often the problems are less easily identified. Some problems are shared by all communities whilst others are specific to individual areas.

Mistaken ideas

Experience from elsewhere, particularly in the United States, suggests that there are a number of planning fallacies.

1. First there is the mistaken idea that people panic when there is a disaster and that self-preservation is the major concern. There is considerable doubt as to whether panic occurs on a significant scale, though it has been claimed that it occurred in Darwin in 1974.
2. People have claimed that those who do not panic are nevertheless disorganised, unable to act rationally or co-ordinate their actions. Thus the belief has grown that we should have strong centralised authoritarian control in the emergency phase, a military type approach. This, too, is questioned very strongly by those who have studied post-disaster situations.
3. There is an exaggerated idea that the community is so paralysed that help from family and friends is no longer available so that official assistance must step in. Again all studies that have been undertaken, particularly in the United States, seem to run counter to that belief. Certainly some do suffer psychological shock, but there are far more that do not. The bulk of the population, however, is stimulated to take action and does not need the outside help the planners think they should have. Perhaps we do not always need to mount major relief operations from outside, the people on the spot have got more resilience than they are given credit for.
4. There is a belief that local organisations, particularly the voluntary organisations, because of wide-spread personal defaulting by their members, are unable to handle emergencies. Such groups are assumed to face a conflict between their own personal responsibilities and their responsibilities to their organisation. Once again this does not agree with the actual situation. It is frequently, however, a thought at the back of the minds of planners with the result sometimes that the local persons in control in State Emergency, Police or local authority, may doubt whether outside voluntary bodies will be able to act effectively. Therefore there is an inclination to bring in outside relief personnel. This does not seem to be justified or to be based on a detailed analysis of the situation.
5. There is a belief that anti-social behaviour surfaces after an emergency and social control is weak, and that such problems as looting became severe. Once again the studies seem to suggest that this has been grossly exaggerated. The problem of security, the need to divert personnel to maintaining security, even the consideration of military law and making the security officials very conspicuous seem to represent an over-reaction.
6. It is sometimes considered that following a disaster the community's morale is inevitably at a low ebb so that people feel like leaving the area, throwing up their jobs, or closing their businesses. Officialdom may feel a responsibility to undertake a morale boosting programme to show the victims of the area that they are not forgotten. This too seems to be a questionable policy which may in fact contribute little, but rather waste money, get in the way of the people on the job and perhaps contribute little to morale. Often the morale is not undermined and indeed it has been demonstrated that morale rises rather than declines after a natural disaster. People get together and do things and co-operate in ways that otherwise would not have been done.

In conclusion I hope that the remarks I have made will enable the sorts of problems which can result from a tropical cyclone disaster to be identified. In particular I hope that I have been able to indicate directions in which further thought should be directed and some of the matters which require pre-disaster planning and analysis.

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THE MITIGATION OF NATURAL HAZARDS IN AUSTRALIA

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FOREWORD

The author was priviledged to be invited to spend six months in Australia working with the community of researchers and practitioners who are engaged in the difficult task of structuring Australia's priorities in the field of natural hazards. He interviewed more than 100 people in government, academia, professional practice, and the public; he participated in seminars and conferences which addressed the subject of natural hazards; and he reviewed literature and activities which reflect the status of natural hazard mitigation in Australia. This paper contains his overview of the scope and nature of this activity, and his assessment of its effects and potential.

INTRODUCTION

A decade of natural disasters has produced within Australia a dedicated group of people who are committed to the field of endeavor which has become known as natural hazards mitigation. These people represent several disciplines, institutions, and perspectives. While unified in their concerns and zeal for disaster mitigation, they have not been successful in achieving hoped-for levels of coordination, recognition and action which they judge to be warranted.

A brief summary of activities in the natural hazards mitigation field will amplify the above observations. It will seem that, while readily identifiable, the scope of this relatively new field of endeavor is ill-defined. Further, some excellent applied research has produced some problem solutions, especially in technical areas; yet, these solutions go wanting because attention has not been given to certain important areas within the behavioral and social sciences. Finally, it is concluded that an opportunity exists for effecting natural hazards mitigation in Australia, but that strong leadership must come from some source if the opportunity is to be seized.

ACTIVITIES IN NATURAL HAZARDS MITIGATION

Widely diversified groups of organizations and individuals identify their activities with natural hazard mitigation. Universities, governments, professional societies, citizens' groups, and standards-writing bodies are involved as organizations. Individuals with backgrounds in engineering, sociology, behavioral science, psychology, geography, emergency services, architecture and, simply, surviving disaster also contribute.

With such wide ranges of individual backgrounds and institutional perspectives, it is difficult to organize in a meaningful way the activities which are in progress. The problem is compounded by the lack of clear understanding among participants within the field as to exactly what constitutes a natural hazard. Drawn into the field of natural hazards mitigation activity have been considerations of the impact of such natural phenomena as drought, soil erosion, microbiological infestation, insect plague, stress due to isolation, and disease.

Structuring the Field of Natural Hazards Mitigation

There appears to exist two principal points of view on the structuring of the field of natural hazards mitigation. One point of view tends toward encompassing all natural phenomena which may impact adversely on man and the environment in which he lives. This viewpoint recognizes the very important interrelationships that exist between man and his environment and seems to suggest that man needs to understand these complex interrelationships before he acts in a mitigation sense. The alternative point of view is more direct. It recognizes the historically established natural hazards which face Australia—flood, cyclone, bushfire, drought—and focuses on them. This viewpoint holds the position that reductions in annual costs and in vulnerabilities of major population centers will require immediate and decisive action centered on response to specific natural hazards.

The two points of view are represented by two principal attempts at organization and action. Growing out of the Canberra Symposium on Natural Hazards in 1976, a core of concerned professionals, largely academics but including representatives of government and the private sector, recommended the formation of a Natural Hazards Council. The purpose of this council would be to advise government regarding priorities for research and planning attendent to the development of an effective natural hazards mitigation program. The scope of the council's activity would encompass a long list of natural hazards, including climatic, meteorological, environmental, biological, and geophysical phenomena.

Concurrently, the Federal Government initiated action to establish a natural hazards insurance scheme in formal collaboration with the insurance industry. This action was brought about by economic realities resulting from the Brisbane Flood and the Darwin Cyclone (1974), with specific concern for the reinsurance needs of the insurance industry. In this formally structured response government took the lead, involved certain professionals in the academic, private, and industry sectors, and focused on the major problem hazards—flood and cyclone.

At this writing both initiatives are alive, but neither has come to fruition. The Government has not been responsive to the formation of a Natural Hazards Council. The proponents of this approach are searching for alternative mechanisms for organizing their activities and presenting their concerns. The natural hazards insurance scheme continues to be studied through government leadership. Progress toward implementation has been slowed by growing concerns about certain unknowns surrounding the concept. Uncertainty has been expressed regarding the impact of such a scheme on building in hazard-prone areas.

Research Activity

Notwithstanding the absence of national policy and central leadership, some organizations and individuals have acted to initiate and bring to completion much-needed research. The Department of Construction (Federal Government) exhibited strong leadership in stimulating the research and attendant building code activity which has solved technical aspects of the cyclone-resistant housing problem. Also involved in this effort were researchers at the James Cook University of North Queensland, mining companies and engineering consultants in Western Australia, and many professional engineers and architects in cyclone-exposed regions around Australia. Research in flood prediction, stimulated in part by the Australian Water Resources Council, has produced significant advances in this technology, although many unresearched problems stand between it and successful disaster mitigation in the flood area. Similarly, organizational initiatives by the State of Queensland (Beach Protection Authority) and James Cook University have produced technical solutions to the storm surge prediction problem. Utilization of this technology encounters difficulty in economic, behavioral, and governmental contexts. Bushfire and drought research is being conducted by Federal and State governments, with some results being placed into practice.

Clearly, the areas requiring increased research and planning relate to behavioral, psychological, social, economic, and organizational aspects of natural hazards mitigation. Pioneering work is being done in the behavioral and psychological areas at James Cook University and the University of Queensland. This work was stimulated in part, by the Department of Social Security (Federal Government) following the Brisbane Floods and the Darwin Cyclone in 1974. Results of these initial efforts are revealing new and unexpected perspectives of the natural hazards mitigation problem, thus enhancing a growing appreciation of the need to examine these aspects of total system response.

PROJECTED ACTIVITY

The review of natural hazards mitigation activity in Australia reveals a discipline which is identifiable but ill-defined, active but uncoordinated, and productive but unfulfilled. Organizations and individuals who readily identify with the field are zealous and committed, but often frustrated. Clearly, there is a need for strong and effective leadership.

In situations where a national policy and action are warranted it is often concluded that "the government" should provide the needed initiative and leadership. In the case of natural hazards mitigation in Australia, this approach does not seem logical. The Federal Government does not have a clear mandate to act in this area; hence, any action would have to be initiated with the consent and participation of the several States. In addition, governments in current political and economic environments do not seem to have the patience required for the long and in-depth examination of the problem suggested as necessary by the experts who see many potentially destructive natural hazards on the horizon.

It seems more logical that leadership should come from within the ranks of professionals committed to the field of endeavor. Further, the leadership structure should evolve around the capabilities and, even, the personalities of the people involved. Finally, it should include, to appropriate degrees, representation of the many points of view and disciplines involved.

It could be argued that the group which grew out of the Natural Hazards Symposium and which recommended the formation of a Natural Hazards Council has the leadership qualities needed. While this group remains viable and continues to exercise a certain amount of effective leadership, it lacks an organizational base, has been unsuccessful in establishing one, and tends perhaps, to emphasize research at the expense of applications.

A group which seems to have many of the requisite leadership qualities is evolving at James Cook University. Comprised principally of engineers, geographers and behavioral scientists, this group has an established record of commitment and involvement with natural hazards mitigation activities which dates from 1972. The group is strong in specific areas related to cyclones and their impacts, and has enough depth to address aspects of other hazards. Further, its members have gained the professional stature which will permit them to work effectively with other centers of activity. Perhaps most importantly, the group has unique problem perception capability—vested in its geographers—and problem organization capability—vested in its systems engineers. If a nominal amount of support could be assigned to this group they could play a significant role in the structuring of natural hazards mitigation priorities in Australia.

CONCLUSION

Australia is a unique continent by virtue of its natural hazards, and a unique country because of its state of development. Where natural hazards mitigation is concerned, an opportunity exists for the country to act decisively to prepare its developing communities to cope effectively with the natural events which *will* occur. Building practices, insurance, education, emergency plans, city plans, etc. can be structured to minimize the effects of

natural hazards on communities. Further, this can be done before vast areas are exposed to hazards such as flood and storm surge, before insurance schemes become committed to ineffective concepts, and before people become too dependent on the "it can't happen to me" attitude.

Strong leadership can be expected from within the group of people from several disciplines who have a commitment to natural hazards mitigation in Australia. To be effective, this leadership must have the support of government and the private sector. A plan wherein a group of professionals with an organizational base—perhaps a university—assumes responsibility for research and application of results could work in Australia. The people who are involved in the natural hazards mitigation field are diversified, but not too numerous or isolated to be responsive to leadership evolving from within their ranks.

It appears that the most promising approach to organizing natural hazard mitigation activity in Australia—from research to application—will involve the assumption of leadership by the community itself. An organization with individuals who have the professional stature to command respect, yet remain open to suggestion and willing to yield to outside expertise, could fulfill into this role.

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HUMAN RESPONSE TO NATURAL DISASTER

John Oliver

"Each year, on average, thirty major natural disasters occur somewhere on earth; perhaps half affect cities. Each year on the average, one or two small- or medium-sized American cities will suffer severe damage. Once in several decades a great city may be devastated. Reconstruction following such disaster is a sustained effort of two to ten years and now costs the United States about a billion dollars per year, directly affecting the lives of hundreds of thousands" (*R.W. Kates, 1977*).

Experience during this century has demonstrated some interesting trends. The value and amount of material damage in disaster prone areas have grown markedly over the decades. This is to be expected because there has been more investment and activity at risk. Technological and organizational protection against the threat of a natural hazard has been significantly improved. For a time, this resulted in a decline in injury and death, but as population has increased, particularly in the towns, the death rate too has started to increase. Potentially then, even assuming our normal expectation of natural hazards has not changed, and despite improvements in our physical capabilities to deal with disasters, the threat of the natural hazard is assuming a greater significance in our individual and corporate lives.

We might briefly propose some form of definition of natural hazard. We are thinking of a possible event of geophysical or meteorological origin which is of sufficient scale to be liable to cause excessive disruption, damage or death to man and his activities. In many instances its occurrence is sudden, a drought is an exception, and unexpected (though there will be varying lengths of warning period we might expect for different individual types of hazard).

There are of course many threats to human safety and possessions which are not of natural origin, such as war; or which result from a combination of natural and man-caused conditions such as atmospheric pollution or a dam bursting. There are a whole range of biological or health threats to man, animals and plants. In some respects the upheavals such disasters may cause are already catered for to a degree, or can be foreseen as a threat, some time ahead of their occurrence. In other ways the problems and solutions may be similar to those associated with natural hazards.

Queensland experiences only a selection of the possible natural hazards. The most extensive and serious are dought, flood, bushfire, wind squall and tropical cyclone, though more localized events, sometimes severe, can include tornadoes, lightning, hail, coastal

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Professor John Oliver: Head of Geography Department, James Cook University of North Queensland. Organizer and Chairman of discussion sessions of Institute of Australian Geographers on Natural Hazards. Member of Working Party of Australian Academy of Social Sciences on Natural Hazards in Australia. Inaugural meeting, September, 1977.

March-June, 1977: at the Natural Hazards Research and Applications Information Centre, Institute of Behavioural Science, University of Colorado. Participated in and contributed to a number of workshops and seminars on Natural Hazards during this period and lectured by invitation to the International Hurricane Conference at Biloxi, Mississippi, May, 1977, officially representing Australian Bureau of Meteorology.

A number of publications on Natural Hazards especially in north-east Australia.

erosion, soil erosion and landslip. The sorts of problems we are concerned with in this seminar arise mainly from flood, bushfire, severe winds and tropical cyclone. The tropical cyclone is in some ways a special hazard since it often takes on a complex form when severe wind damage is accompanied by floods from torrential rainfall or, in coastal areas, from a storm surge. Heavy rain may also cause excessive damage, even without severe floods, to exposed goods or to standing crops or through soil erosion. Since so much may be happening at the same time the community, and the services available to assist it, are put under severe stress in many directions.

Human communities may respond to natural hazards in one or several combined ways. The particular pattern of response is very complex depending on cultural differences between different communities, including their levels of economic and technological development and their social structure. How the individual, or the family, the group or the neighbourhood view hazard situations reflects the nature of their perception of the threat and the relative values they place upon the forms of disturbance and disruption. The attitude of mind differs between the man in the street, the official or administrator concerned with the planning of the general day-to-day life-systems of the community or the personnel who have a special concern for dealing with the impact of unusual stress conditions such as those arising from a natural disaster. Voluntary agencies often have to be more self-contained, having less resources or back-up than official organizations. They will view their functions with different emphases. Levels of experience of a specific disaster provide another filter through which these responses will be viewed. Mobility of the population and contrasts in the memory of the past experiences between the individual and corporate groups with varying fields of involvement add to the diversity of response.

In the light of so many points of view, and since the community itself, its outlook and its resources are dynamic, it is not a matter of surprise that conflict of plans and actions to deal with the stressful consequences of a natural disaster arise. These particular problems of difference in viewpoint and conflict or overlap in intentions in the attempts to ensure the maximum community welfare are of particular concern in trying to assess the goals and functions of social work in the special context of disaster. Many, but not all, of the social welfare problems are the same as those that are to be anticipated as a normal accompaniment of a community's life. They are likely to occur with greater frequency or severity in a post-disaster situation. Some stresses, however, are so unlikely to occur outside a disaster situation that they are unique to that situation.

Human responses to natural hazards can be grouped under a number of headings. A number of these are pre-disaster reactions designed to mitigate or prevent the ill-effects of any future disaster.

1. Surveillance and warning

In areas where past experience has indicated the significant probability of a hazard situation repeating itself in the future a community usually sets up a warning system. The tropical cyclone centre at Brisbane which monitors the summer atmosphere of the Coral Sea and the Gulf of Carpentaria and has an elaborate communication, watch and warning system for tropical cyclones provides an example.

What is meant by a significant risk, how do we re-act to warnings, does the ordinary person understand the full meaning of the warning, can we be over-warned? These and many other questions involve us in the very difficult task of understanding human psychology and behaviour in the face of a hazard threat.

There are major problems too in ensuring that warnings reach people and in good time and are understood.

2. Modification of the disaster itself

We may attempt some form of weather engineering. We can attempt by cloud seeding to produce rain to break the drought, we may aim at spreading the energy in the tropical cyclone so that it is not so intense at a particular place or think of steering it away from a particularly vulnerable area. We may try to reduce the potential intensity of a large bushfire

by reducing the build-up of inflammable ground cover through a previous programme of controlled burning.

There are many other examples, but in many instances, at present, we adopt other responses than those which affect the trouble at source.

3. Better protection through engineering technology

Engineering capability, so long as it is coupled with ample finance, can eliminate most, and minimise the impact of all disasters.

Professor Walker will demonstrate what we could or should do through improved building design and building codes to protect our built structures from the wind or possible foundation erosion. We can extend these levels of protection to rail, road and bridge foundations, to coastal defences and harbour works. We can do much to reduce the unruliness of our rivers in flood or we can irrigate an area, water being available, so that drought is eliminated.

It is not uncommon for the bill to be paid by one part of the community and for others to reap the reward as well as generating a further costly problem for the future. Extensive use of a flooded plain below a dam which reduces but does not eliminate the flood threat is a prime example of this situation.

4. Spreading the risks through insurance

A community or individual may decide to take a chance on the risks. The extent to which a person wishes to protect himself from loss may lead him to take out insurance. In the long run this insurance response does no more than to spread the load of material loss across the community. Inevitably there is an additional cost of administering the insurance scheme and the financial return to the insurers. If some make no effort to reduce the risks or the effects of a disaster upon their property whilst others, who may be more danger-conscious, take precautionary steps then the latter bear an unfair proportion of the insurance costs. So much depends upon how widely the insurance burden is spread.

5. Avoidance of the danger

Other than staying put in an area and doing what is possible to protect oneself from the worst effects or sharing the burden, one can consider avoidance of the danger. This response can take on two forms:

(a) On a long-term basis it can be decided not to build in a flood or surge risk area or a high risk bush fire zone and to gradually or immediately remove or dismantle premises in the hazard areas. Land-use planning can be used to remove people and property from hazardous areas. Amongst other things there is a need for precise information on the hazardousness of particular areas. This raises the question of the probability of a hazard. In particular this is a matter upon which Professor Stark's modelling of storm surges contributes valuable data.

(b) On a short-term basis evacuation of the people from areas of high hazard risk can be undertaken before the event occurs. This primarily avoids death, injury or psychological stress and does not save fixed property. Large scale evacuation is an expensive operation causing great social upheaval and potentially can cause serious loss of life or hardship if the disaster develops differently from anticipation. Problems of avoiding panic and confusion in movement, avoidance of disorientation and separation of families at reception centres demand a high order or organisation. At this time in particular the critical importance of a good communication system is emphasized.

6. Post-disaster rescue and recovery

Finally, one can consider the range of responses which are directly associated with the occurrence of a disaster in a given locality. When a disaster takes place a number of post-disaster phases of activity can be identified. These phases overlap.

(a) Whilst the event is actually taking place it is often difficult to achieve much since action to rescue or protect may put at risk rescuers as much as the threatened.

(b) Immediately the severity of threat decreases and permits action, in the matter of the next few hours or days the emphasis is upon search and rescue and on the restoration of basic services, water, electricity, or gas, the provision of food and medical necessities, the reinstatement of transport and communication systems and the temporary fixing of damaged buildings and the placement of tarpaulins as well as the maintenance of public order. In this phase evacuation may be considered necessary as for instance in Darwin. An urgent need then is to have available a record keeping system which can ensure that families do not lose contact and so that precise information can be available for future use. A major problem is the hardship that can arise if those who leave a disaster area are prevented from return until given official permission. Already community welfare needs start to appear, for example individuals or families may need emergency finance if pensions or welfare payments cannot be drawn. This is the phase when the specially trained personnel of the State Emergency Services and others are most concerned. Their function does not extend to the subsequent phases. They have to be kept at a high level of readiness even though demands on their services may occur only at long and irregular intervals. This phase is the *emergency phase* and may last up to eight days or so.

(c) The *restoration period* on average from experience lasts about ten times that of phase (b). It is a phase when patching up repairs are undertaken. Steps are taken to restore life to normalcy and to repair public utilities, houses, factories, commercial buildings. Where relocation is necessary this is time when the temporary housing will be provided and attempts will be made to get manufacturing units back into operation. Specific effects of the disaster are dealt with in this phase. Since bureaucrats increasingly must be responsible for their actions, snap decisions to deal with urgent restoration needs are less and less willingly made in this phase.

(d) The *recovery phase* is a longer term period again, on average likely to be of the order of ten times the duration of the preceding phase. The aim of this phase is the reconstruction of the life style and the quality of life back to the level available prior to the occurrence of the disaster. It may be that in this phase improvements can be incorporated when replacing the original features of the community's surroundings. Experience from a number of major disaster stricken cities in different parts of the world suggests that this phase has persisted between two and about eight years.

During phases (c) and (d) and even perhaps starting in the early days of phase (b) planners must formulate the answers to the problems of distrubed social structures, disrupted work opportunities and travel to work patterns and unbalanced shopping facilities. Under the pressures of urgent needs to repair a disrupted economic and social system, it is difficult to take advantage of the possible opportunities to improve on the urban plan and amenities without appearing to delay the resolution of the communities' unhappiness and suffering. In consequence the restoration phase is characterised by false starts or unsuitable temporary solutions which have later to be replaced by more acceptable longer term solutions. It is also difficult to avoid situations in which the experts or specialists appear to dominate the replanning and rebuilding whilst the suffering populace belive they are helpless pawns in the process. Reviews of post-disaster situations elsewhere emphasize the importance of the professional groups initiating but not controlling many of the community recovery activities especially at neighbourhood levels. Information exchange in the recovery phase is important so as to reduce suspicion or misunderstanding.

Ideally we might avoid the delays and conflicts if reconstruction plans could be discussed prior to the occurence of disaster. The intention would be to have both contingency and long-term plans ready to take from the pigeon hole and implemented from the moment reconstruction could start after a disaster. The conclusion of United States workers, however, is that the "reconstruction period is the most neglected". There is a great deal of planning for emergency response but little aimed at long range restoration or reconstruction. There is another danger which can arise in reconstruction planning. Experience has shown that over-ambitious plans tend to be counter productive.

This seminar is concerned with community welfare and in my concluding remarks I want to focus upon some of the problems that may be expected to surface in a disaster affected society.

Not all of a community will suffer. Of those who are victims not all will need major assistance. Those who can mobilise their own resources or can anticipate kinship assistance can initially recover usually quite rapidly. Those who can take advantage of a variety of institutional aids are likely also to see their material recovery to their former life style take place more quickly and easily. There are others, especially those who are poor, those who are older or those who cannot find moral and psychological support from the family or the neighbourhood who find it impossible to make progress in the recovery and reconstruction phases — they may sink from bad to worse unless they are rescued. A family with several young children, for example, may be under major stress if resources are lost in a disaster. Recovery resilience varies.

We are talking not so much of the emergency rescue and search phase. This is a time where, with the assistance of the State Emergency Services, the Police, the Army and Voluntary Agencies and the medical authorities reinforced by that temporary phase a very active community co-operative concern to help people in trouble, immediate life needs are rapidly provided. We are concerned rather with the phase which follows the withdrawal of the emergency services. This is the time when it is perhaps too readily assumed that the normal welfare services and community systems will be able to get into gear again and be capable of resolving and absorbing the additional load of the residual problems of the disaster.

A whole host of welfare and counselling services are needed. We can distinguish at least three headings for concern — life-happiness, homes and jobs. Two broad types of recovery are involved — housing recovery and family recovery. A further distinction may be between family and individual recovery. Studies of other communities, admittedly few in number, indicate that psychological difficulties and unhappiness may persist a year or two years after the occurrence of a disaster. Surprisingly, it has been found that such difficulties have continued some time after the apparent recovery of material living standards. But even after a new home has been established families have shown evidence of the psychological shock caused by the initial loss of their home and furnishings and other personal possessions. A family may be re-established but not recovered. Some individuals suffer disaster shock and are disoriented by the stresses and strains of the experiences they have undergone during the disaster. Whilst the impact of loss or serious injury of relative or friend is often the cause of the most immediate distress, there is a much wider range of social/psychological stresses which require the aid of experienced social workers. It is not always easy to identify where the needs are, but it must be appreciated that even if the numbers who require social welfare aid are only a small portion of the total populace nevertheless there is an important need. It becomes urgent to identify the families in particular need or who are especially vulnerable to the post-disaster stresses.

When a community is disrupted on a large scale, social groups may inevitably be divided up. Neighbourhood solidarity, which of course exists to varying degrees, is upset and peoples' social visiting patterns are disturbed. Peoples with different outlooks, different ethnic backgrounds or different needs may be hurriedly housed together in temporary accommodation so that tensions occur and personal and family conflicts arise. Living with relatives or friends on an extended basis is likely to generate social strains. These difficulties may be compounded by the disruption of work opportunities where factories or offices are destroyed. Experience elsewhere indicates that it is the less skilled or unskilled part of the work force which suffers most. The problem may be aggravated where new work opportunities are relocated or expanded in parts of the town distant from the rehoused workers, so that not only travel distances and patterns are drastically changed, but costs are increased. Earning capacity may be reduced. Similar problems arise where the normal patterns of shopping or travel to schools, church or recreational activities are upset when an abnormal redistribution of people and their needs is caused by the disaster.

Persons faced with rebuilding may find that the receipts from insurance payments are inadequate either because of under-insurance or because of inflation. Some may need guidance even earlier concerning their insurance rights or how to claim. Others have wrecked premises but still have mortgage payments to maintain and do not know what to do. Those

seeking to push on with repairs may find the work held up because the demands on the limited number of building inspectors have become too great. Many will be overwhelmed by such problems in which they have little or no experience in solving. Where to start looking for financial help is a major unknown. In the United States, in some post-disaster recovery situations, it has been found that reliance on kinship sources of help rather than taking advantage of institutional sources has actually delayed housing recovery. There is usually too small a loan capacity from private sources.

Even a community as a whole may have lost part or all of its local tax base or other sources of income. At a particular level of disaster a stricken area can anticipate a major inflow of relief funds from a variety of sources and with or without strings attached. The task of allocation of such funds requires outstanding qualities of efficiency combined with sensitivity, compassion and judgment. Here is a major problem of community welfare. The situation most to be avoided is the addition of argument and feelings in inequity to the consequences of disaster. Too often relief has been marred by bitter argument.

In the final account it has yet to be decided whether a disaster is wholly bad. Some would even claim overall benefit for the community. Development monies come in from relief or insurance payments, aspects of urban renewal may be forced upon the community, new and better buildings may replace old, decisions or projects upon which feet have been dragged are launched and major social or economic deficiencies are highlighted so effectively that.important gaps in community needs are filled. Some would claim that qualities of unselfishness, altruism and co-operation are given a major stimulus. It is doubtful whether the individual victim will see the overall balance sheet in this way. It still remains to be confirmed whether the community as a whole reaps an eventual benefit. However, a stimulus that brings a number of people to meet and talk together as in the case of this seminar is surely to be acknowledged as one of the credit entries on the balance sheet.

Uncertainty about what to do becomes critical when the emergency is upon us. In rehabilitation too uncertainty is a major danger. I shall take my concluding remarks from a recent book *Reconstruction Following Disaster* (1977). Editors J.E. Haas, R.W. Kates and M.J. Bowden)

> "Public officials must also move to reduce uncertainty. In the aftermath of disaster too much uncertainty adds to the social and psychological disruption of the victims, slows reconstruction and leads to wasteful duplication and squandering of resources and to frustration of basically sensible plans. Early decision-making and dissemination of information about such decisions is a major answer to the problems of uncertainty". (page xxxiv)

A further quotation from the same source is also apposite as part of the conclusion.

> "The prime role of top urban leadership, focused as it may be on the emergency, may be misplaced. A case can be made for mayors and managers of cities to heed the reconstruction committees whilst delegating the emergency leadership to specialists. Emergency organisations exist for the emergency and their priorities are clear. The outside agencies and consultants need the strongest, most representative local guidance and leadership. The consensus — building role of the top leadership is needed on the drawing boards, not on the fire trucks" (page 279)

> T. Drabek remarks "Community leaders responsible for civilian welfare in such events (disasters) should begin their planning efforts with an understanding of the perceptual world as it appears from the view of family members and then shift back to their own more global community-wide persepctive" (Drabek, 1971).

How the individual or the group view their problems and their needs becomes a vital element in the final assessment in the successful provision for community welfare in a disaster situation.

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RESEARCH INTO TROPICAL CYCLONE ACTIVITY BY THE PHYSICS DEPARTMENT, JAMES COOK UNIVERSITY

James F. Ward

The Problem:

It is unnecessary to emphasise to northern Australian communities the significance of studies of tropical cyclones. Much sociological study of effects on personnel, and engineering study on design of structures to withstand high winds or to shelter persons from devastation, has taken place.

The fundamental problem, however, is one of the physics which will designate the causes at origin, the maintenance regime, the later decay and the path history whilst viable. The Physics Department, James Cook University, and theTropical Research Unit for Meteorological and Atmospheric Studies — TRUMAP — which it sponsors, has been concerned with this important scientific investigation for a number of years. The Tropical Research Unit for Meteorological and Atmospheric Studies was established in 1969 at the time when some of the earliest radio studies of tropical cyclones were being made. It has led to the formation of TRUMAP — SOUTH PACIFIC, which is concerned with similar studies throughout the South Pacific region — a zone of high tropical cyclone activity. Studies have now been instituted and are proceeding under my direction in the Tropical Research Unit for Meteorological and Atmospheric Studies at the University of South Pacific, in Fiji.

The problem for physicists is to study some of the fundamental reasons why low pressure atmospheric systems concentrate into recognisable tropical cyclones; why they are maintained; what their characteristics are: what controls their paths; and why they decay. In much of natural science to understand behaviour often leads to a measure of control of characteristics. Despite the awesome energy concentrations to be contended with in cyclonic conditions, the physicist is ever aware that his great task, and most effective contribution, is to face up to the question of the possibility of modification of tropical cyclones.

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As a specialist in radio and atmospheric physics, Professor Ward first became interested in tropical cyclones because of the electrical and radio frequency interference they produced. Using his H.F. ocean radar equipment in Townsville he was able to track Tropical Cyclone "Bebe" in 1972 when over Fiji. This lead to continued interest in radio tracking and systematic studies over the years of the electrical and magnetic effects. Some of the most sensitive electrical and magnetic measurement equipment in the world is now used in the Physics Department at James Cook University in these studies which, year by year, seek to unravel the significant forces operative within cyclones.

Studies of these aspects of cyclones for Papua New Guinea and the South Pacific (University of South Pacific in Fiji) are co-ordinated by the Tropical Research Unit for Meteorological and Atmospheric Physics -- South Pacific: (TRUMAP - SP) of which Professor Ward is the Director.

Since the early 1970's the radio tracking equipment at James Cook University has been used to study the movements of tropical cyclones at great range. For example, "Bebe" was tracked whilst passing over Fiji. Cyclones in the Gulf, out of Darwin, and out of the Indian Ocean can be monitored at Townsville by the radio activity in the H.F. radio spectrum produced from their internal lightning activity. The high resolution, continuous azimuth scanning array, associated with the Physics Department's ocean radar has been used for this purpose and a large number of cyclones were tracked and documented in this way by the late Dr L. Henderson. During his work it was found that the degree of activity and intensity and the life history of tropical cyclones could be estimated from the radio frequency behaviour. New equipment was designed therefore to study the lightning burst statistics as detected in the H.F. spectrum, and it was possible to find a method to characterise tropical cyclones in this way and to note that they exhibited a peculiar rise and fall of activity. This appears to be a previously unreported property and may be a valuable clue to the path to elucidation.

The Long Range Ocean Backscatter Radar at James Cook University is capable of studying the surface wind systems above the rough oceans within the cyclonic region since the seawave pattern is related to the directions, the intensities, and the durations of the cyclonic winds at the surface. These studies form part of the general experiments in radar oceanography which are a major ongoing research activity of the Physics Department, James Cook University. In this work a very close association has been maintained for many years with the Bureau of Meteorology, some of whose staff participate in the continuing experiments.

Sufficient evidence has now been found to indicate that the electrical activity within tropical cyclones must be studied in detail as a possible major mechanism in their life history.

In 1977, I made the first ground based measurements within a cyclone vortex of the electrostatic fields and the anomalies to the earth's magnetic field arising from cyclonic activity near Townsville. These have created wide interest in Australia and overseas and are seen to be an important clue. Special equipment designed at James Cook University is used in a cyclone-proof, transportable, field station which is anchored securely in the estimated path of the cyclone, left to record the significant parameters, and subsequently recovered.

In 1979, in association with the National Oceanographic and Atmospheric Administration of U.S.A., it is hoped that "Orion" aircraft flights from Townsville into North Queensland tropical cyclones will enable further specially-designed equipment of the Physics Department to be flown into the vortex eye of these weather systems and enable the centres of electrical activity, thereby, to be pin-pointed.

In this way, season by season, the understanding of the essential physics of the tropical cyclone is being built up. If a significant trigger mechanism for the formation and growth can be identified, then the possibility of applying a physical variation for amelioration or for modification can be assayed. This, potentially, could have untold benefits for life in both Southern and Northern hemisphere tropical cyclone regions.

Major research projects over a number of years involve a number of participants. I have been fortunate to have the collaboration of the late Dr L. Henderson, of Mr B. Gibson-Wilde (TRUMAP, Australia), Mr P. Dexter (Bureau of Meteorology), and Mr D. Galloway, Mr R. Casey, and Mr R. Rose of the Physics Department, James Cook University.

Results of research projects are contained in publications as listed.[1]

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SAFETY OF HOUSES DURING TROPICAL CYCLONES

George R. Walker

In terms of its impact on the community, cyclone 'Tracy' was the most disastrous single event to have occurred in Australian history. The most significant aspect of the damage and the primary cause of the magnitude of its impact was the failure of housing.

At the time of cyclone 'Tracy', there were between 8000 and 9000 homes in Darwin. Following 'Tracy' it was estimated that approximately 5000 of these were destroyed, or damaged beyond repair as far as their main structure was concerned, and only about 500 remained intact and continuously habitable. Consequently about three-quarters of the population of 46000 had to be evacuated and the life of the community was totally disrupted.

Investigations showed that the damage to housing was largely due to totally inadequate strength for the magnitude of loads imposed by severe winds of the magnitude experienced in 'Tracy'.

The theme of this seminar is natural disasters and community welfare. Cyclone 'Tracy' demonstrated very clearly the close correlation between the safety of houses during tropical cyclones and community welfare needs following such events.

This is not going to be a detailed lecture on the engineering of houses. Rather, in the short time available, I would like to lay down some basic principles.

First, I shall discuss the basic engineering approach to natural hazards, and then I shall talk about the wind problems of tropical cyclones in respect of buildings. Professor Stark will later talk about the storm surge problem as another example of the engineering approach to natural hazards.

The point has already been made in this seminar that it is not the natural hazard itself that is the problem, but the interaction of natural hazards with communities. If we did not have people or communities, natural hazards would not create problems. What we are really concerned with is the distress in a community resulting from a natural hazard. If the distress exceeds a certain level we call it a disaster.

It is important to realise that there is no single level of disaster (Walker and Stark, 1977). We can have anything from a local disaster which only affects a small community, to international disasters, where the whole world community tends to get involved, such as the Managua Earthquake, the 1970 Bay of Bengal cyclone, and the 1977 Indian cyclone. The scale of the disaster depends on a number of factors, of which the severity of the hazard is

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important but does not alone define how severe the disaster will be (Stark and Walker, 1976). You may get a very severe natural hazard but if it occurs away from where everyone lives, it may not cause a disaster. Generally major disasters are concerned with natural hazards that affect large communities. Natural disasters have become a problem in our day and age, because we live in an era of large urbanised communities. Other factors affecting the scale of disasters are the vulnerability of the community and the capacity for restoration and recovery of the community. Primarily, this seminar is concerned with the last aspect.

There is not much we can do about changing the severity of hazards, and nor is there much we can do about the size of communities, but we can change the vulnerability and we can improve the capacity for restoration. However I would like to briefly mention some aspects related to the first two factors because we need to have some idea of the likely intensities of hazards. This is where I am going to become specific, and talk about the wind problem from tropical cyclones.

Just because there is a tropical cyclone on the way it doesn't mean that there is going to be a severe cyclone. The range of intensity is very considerable as far as wind and other factors are concerned. For instance we can have a relatively mild event, such as cyclone 'David' which hit Yeppoon, where the maximum wind velocity was only of the order of 110-150km/h. That is a mild event, and normally we cannot expect too much from that. In fact, if it causes damage there is cause for concern. Then we have what we may describe as a moderate event. 'Althea' was a moderate cyclone in terms of wind velocities, with velocities around the order of 200km/h. Cyclone 'Tracy' would be described as a severe wind event with wind velocities getting on towards 250 km/h. Cyclone Joan was estimated to have a wind velocity of that order at its centre indicating that this event can occur in Australia.

Table I indicates a classification of these degrees of severity of tropical cyclones and the approximate associated central pressures and frequency of occurrence in respect of Townsville (Walker and Stark, 1978). It will be seen that the severe and very severe events are also very rare events as far as any particular locality is concerned.

There is a great tendency with the population, faced with these figures, to think that we can forget about the last two. However history shows that the majority of major disasters have been caused by events in these latter two categories and were major disasters because the affected communities were not prepared for them.

Cyclones like 'Tracy' and the worse events have a rare occurrence in a particular community. But their chance of occurring somewhere is much less, because we have to divide the return period by the number of communities to find the probability of any community being affected over a period of time. It is these extremely rare events which are the real problems. The big questions are just what are realistic methods of protection to provide and what are reasonable levels of preparedness to aim at.

The second factor mentioned in relation to level of distress was concerned with population and size of communities. How many people have heard of 'Trixie'? Cyclone 'Trixie' was as severe a cyclone as 'Tracy'. It was a bigger cyclone, in fact, but the wind velocity was about the same. It went very close to the town of Onslow where a maximum wind record was obtained of the order of 250 km/h.

On reason why few people have heard of 'Trixie' is that Onslow is a very small community. In fact, if it had been wiped off the map, it would not have made a big impact. There was a town in Queensland a few years ago almost totally destroyed by a tornado, and not many remember it. It didn't cause a national disaster. So the size of the community is very important. This means that the larger the community the more important it is to take protective measures and to do something serious about it.

The other reason that Onslow wasn't damaged anywhere near as much as Darwin was

because it was much better prepared for cyclones, as is the case in the north west coastal towns generally. One reason for this is that they get cyclones much more frequently, and are more aware of them, but with smaller communities it is also easier to have a disciplined community prepared for them. Unfortunately the larger the community the more important it is to be prepared.

When a cyclone such as 'Althea' or 'Tracy' occurs the problem as far as wind is concerned is the damage to the houses and other buildings (Trollope 1972; Walker 1975). This is what causes most of the subsequent problems. If you get no building damage in a community, then the social consequences tend to be relatively small if wind is the only problem.

The amount of damage depends on three factors. Firstly the wind velocity which causes the forces on the buildings, secondly the degree of exposure of individual houses and finally the construction details. Consider first the wind forces on buildings. Typical distributions of wind pressures on a house are shown in Figure 1. There are two things that affect the forces on the building.

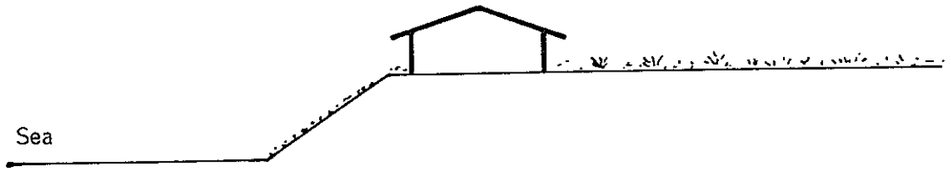
One is the wind velocity itself, forces being proportional to the velocity squared. This means that if the velocity is doubled the forces will increase four times. This is one of the reasons why damage increases dramatically as velocity increases.

The other major factor is the openings in a building. If the openings are on the windward side, the wind blows straight in and pressurizes the inside, like blowing into a balloon, as shown in Figure 1a, tending to cause the building to explode outwards. The wind blowing over the top of the roof usually tends to produce uplift, because of the low profile of most roofs, which combines with the internal pressures in trying to lift the roof up. This is one of the major structural problems in high winds. The other thing that happens is that there is a general sideways force, tending to blow the house over sidewards. So we tend to find then that houses tend to fail by the roof going up, the walls out and sideways.

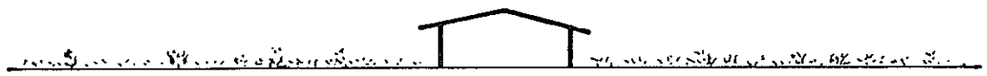
The situation is quite different if there is a leeward opening, because in this case the tendency is for the interior of the house not to be pressurized, but to have suction producing forces acting inwards which tend to hold the structure together as shown in Figure 1b. There is still a sidewards force, but, the uplift on the roof is greatly reduced. Obviously this second situation is much better than the first, and this is the main reason why people are encouraged to open windows on the leeward side. Common initial damage to buildings is failure of a window on the windward side leading to internal pressurization and subsequent disintegration. An open leeward window will also help to relieve pressures in this event.

In general we get various types of failure as shown in Figure 2. The most common failure and generally the first indication that all is not well is that the roof cladding itself starts to peel off. This would be the most common first form of failure. If the roof cladding is well fixed the whole roof itself may lift off. If the building is not adequately braced it may tend to move sidewards and walls may fall in on the windward side and out on the leeward side. There is a tendency for things to go in order. Generally the roof helps to provide support for the walls, and so it is not until the roof goes that the walls start to fail.

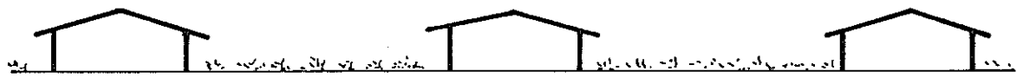
So much for the problem of actual wind velocity, and how wind causes pressures on buildings. I mentioned that the second factor affecting the level of damage is exposure — see Figure 3. The forces on any house will depend on the actual velocity it is exposed to. A house located on the seafront taking the wind coming straight off the sea is in the most exposed position with nothing to slow the wind down at all. The wind velocity there is going to be very much greater than that experienced by a house located in the middle of houses and dense vegetation. The wind forces on the house in Figure 3d for wind off the sea. Between these two extremes are many intermediate situations. There is no doubt that vegetation plays an important role, particularly bushy, shrubby type vegetation which has



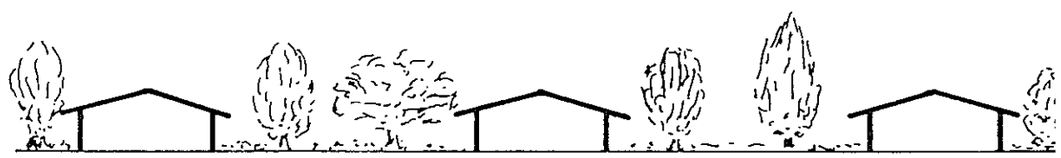
(a) Very Exposed



(b) Moderately Exposed

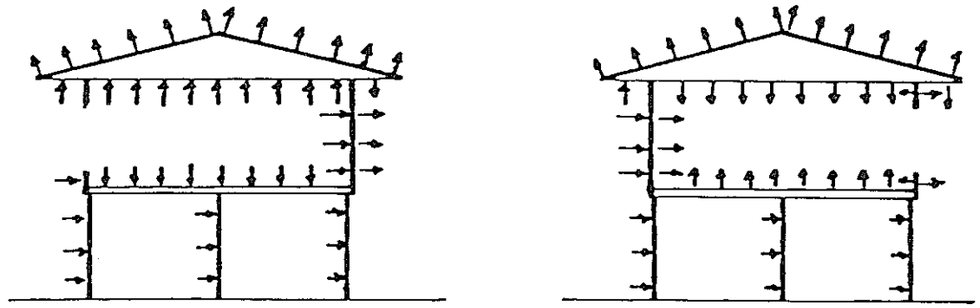


(c) Moderately Sheltered



(d) Very Sheltered

Figure 3. Variation of Exposure



(a) Windward Opening

(b) Leeward Opening

Figure 1. Wind Forces on a House

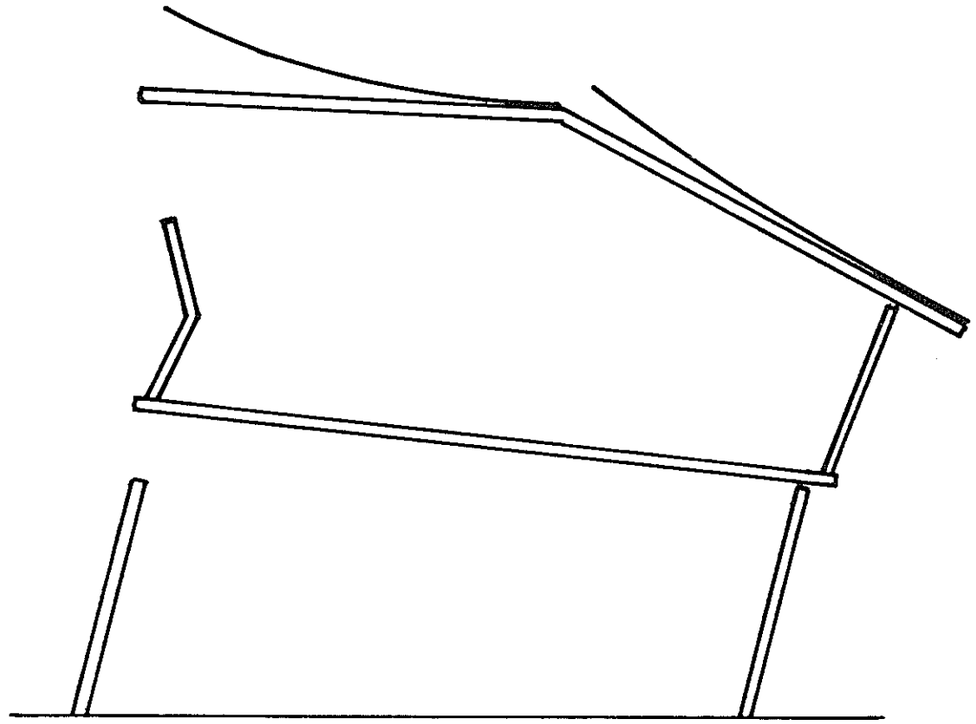


Figure 2. Failure Mechanisms under Wind

leaves that do not come off easily in wind. Unfortunately the large gum trees and similar trees, which have lots of wood but very little in the way of leaves, are not so useful and are more likely to cause damage.

The final factor affecting damage is the standard of construction. Our society over the years has developed a two level approach to building. We have larger buildings, which are designed by one process, and housing which has been traditionally designed by another process (Walker, 1977). The larger structures have been considered much more important than housing and therefore were provided with a much higher degree of strength and structural safety. However when we get a strong wind, it doesn't differentiate between one or the other, and the weaker will suffer the most damage. This has shown up time after time in strong winds.

Cyclone 'Tracy' in Darwin typified this situation with housing suffering much greater damage than the larger buildings as shown in Table II from Walker (1975). This is a situation that was not unique to Darwin, but could happen anywhere in Australia, certainly with housing that was built up to say, two years ago or less, and is one of the things one has to be prepared for.

Since cyclone 'Tracy' this situation is being changed. After 'Tracy' housing in Darwin was rebuilt to similar standards as the larger buildings and progressively we are seeing this approach being extended to other communities as the importance of the performance of housing in respect of community safety and well-being in the event of a tropical cyclone is increasingly recognised. But it is a slow process.

When buildings start to disintegrate they create windborne debris which itself can become a major agent in causing damage to houses downwind creating a "domino" effect. Loose objects and rubbish left lying around also create a dangerous hazard in this respect. It also creates a danger to people in terms of injury and death.

Protection against debris is difficult. Vegetation serves a very useful purpose in trapping it, but the provision of a small room with strengthened walls to retreat to in a cyclone seems the best precaution.

From the point of view of personal safety, failure of masonry structures is generally more serious than other structural failures. Despite all the corrugated iron debris caused by 'Tracy', and the high proportion of timber framed asbestos cement clad structures in Darwin, crushing due to the failure of masonry appeared to be the major cause of death from structural failure.

The implications, should we get a tropical cyclone in Townsville could be as follows. If we get a mild hazard, which could be expected if central pressures are greater than 975 millibars, we shouldn't have to plan for a major disaster as far as wind is concerned. I would expect a certain amount of roofing damage, but any structural damage should be limited to only the odd house that is structurally unsound. For a moderate event, we would expect the same amount of damage as in 'Althea' in most of the town, although among the very recently built buildings we could expect considerable improvement. In Darwin, in a moderate event, a high level of performance could be expected because they now have a large majority of buildings which are structurally very sound. Under a severe event like 'Tracy', and here we are talking about central pressures of the order of 930 to 940 millibars, we could anticipate the damage in the areas of Townsville older than 2 or 3 years to be of the same order as in 'Tracy' — i.e. massive damage.

If the housing could be improved overnight to the new Darwin standards, then, under the severe events, we could anticipate even less damage than we had in Townsville during 'Althea'. This is what is being sought by introducing new building regulations, but of course it is going to be a good number of years before we get that sort of level of construction general throughout the community. In the meantime we must be prepared to cope with social and economic distress that will be the inevitable consequence of cyclones of moderate and greater intensity striking our larger cities and towns.

TABLE I

APPROXIMATE CLASSIFICATION OF TROPICAL CYCLONE CHARACTERISTICS

North East Queensland

MAGNITUDE	CENTRAL PRESSURE (mb)	MAXIMUM WIND SPEED (m/s)	MAXIMUM STORM SURGE (m)	APPROX. RETURN PERIOD (yr)	EQUIVALENT SAFFIR-SIMPSON GRADE*
Very mild	> 990	20-30	0-1	3	1
Mild	970-985	35-45	1.5-2.5	10	2
Moderate	950-965	50-60	3-4	40	3
Severe	930-945	65-75	4.5-5.5	300	4
Very severe	< 925	80-90	6-7	2000	5

* Scale used in the U.S.A.

TABLE II

DAMAGE PATTERNS IN DARWIN FROM CYCLONE 'TRACY'

(from Walker, 1975)

	HOUSING	ENGINEERED BUILDINGS
Serious structural failure	70%	< 5%
Serious cladding failure only	20%	20%
Little or no damage	10%	75%

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STORM SURGES AND THE COMMUNITY

Kevin P. Stark

1.0. INTRODUCTION

A storm surge is the short term change (rise or fall) in sea level produced by a meteorological disturbance such as a cyclone. Every tropical cyclone is accompanied by a storm surge, developed initially by an inverse barometer effect. As the cyclone crosses the coast, the combination of ocean bed-slope, cyclone characteristics and coastal features produces a coupling action which can magnify the inverse barometer effect a number of times. The interaction of the cyclone and the waters over which it passes produces the forcing mechanism for the development of storm surge. An understanding of the structure and behaviour of cyclones is essential before a detailed study of storm surges is undertaken.

Ability to forecast surge heights is required for emergency civil defence measures in the event of a cyclone at a particular place: however, design engineers and planners are also vitally interested in the frequency distribution of surge heights likely to occur near marine structures and adjacent to coastal developments. The waves accompanying storm surges are particularly destructive because they can attack our coastal structures at heights well beyond normal water levels.

A numerical model has been developed at James Cook University of North Queensland to evaluate the characteristics of the storm surge produced by a defined cyclone which crosses the coast near, or moves adjacent to, a nominated coastal location.

Other research studies have been undertaken to predict as accurately as possible, with available data, the return period for different water levels attained by the combination of storm surge and astronomical tide.

1.1. Introduction to Storm Surge and Community

Two major points should be stressed when considering the effects of a major storm surge on a community —

(i) Evacuation before the Event: if a storm surge of major proportions occurs then it will be essential that the section of the community living in low lying areas be evacuated before the surge occurs. This will mean evacuation many hours, possibly twelve or more hours, before the event, **and**

(ii) Education before Evacuation; if such an evacuation is to be safely and successfully executed at a time when a cyclone is approaching the coast and

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bearing down on the community then obviously the community must be properly informed regarding the scale of the hazard posed by a major surge.

These two points — evacuation before the event and education before evacuation pose a number of problems which are the essence of this symposium.

A number of comments can give overview of the effects of a storm surge on a community.

(i) A storm surge accompanies every cyclone. Quite often the storm surge is not reported because the other effects of a cyclone dominate the news.

(ii) Storm surges of five metres or more can be expected as very rare events at most coastal locations.

(iii) Such events might have a probability of the order of 1 in 10,000 years at any particular location but when all possible locations are considered then the probability of such an occurrence somewhere along the coast in our life time becomes a very real possibility.

2.0. GENERAL STATEMENT ON CYCLONIC STORM SURGES

Although this section has been produced elsewhere, it is repeated here in an attempt to make this report more complete and hopefully more useful.

2.1. Cyclones — Terminology

A number of delicate meteorological conditions must exist for the atmosphere to develop a cyclone: unless all these conditions are satisfied, a potential major cyclone does not grow beyond its adolescent stage of a disturbance or a tropical depression.

The term tropical cyclone refers to an atmospheric system that originates over the tropical oceans and in which the atmospheric pressure diminishes progressively to a minimum value at the centre. The winds in this system blow spirally inward from all sides with a clockwise circulation system in the Southern Hemisphere, as in Figure 1. The air which is carried into the eye of the cyclone is carried vertically by convection and a pumping action generated by a high altitude wind system. As this moist air rises the water vapour in it is condensed and forms clouds and eventually precipitation. This condensation releases large amounts of heat energy which is available to promote the development of the system.

In Australia the term hurricane is not used by any tropical distrubance with winds greater than 33 kn is classified as a *tropical cyclone* and if the extent of the disturbance is more than 160 km from the centre it is referred to as a *major tropical cyclone*.

2.2. The Structure and Dimensions of a Cyclone

Cyclones are born over warm tropical waters where the temperature must be at least 27°C. The spiralling cyclonic action is produced by Coriolis forces developed by the rotation of the earth — clockwise in the Southern Hemisphere, anticlockwise in the Northern Hemisphere.

The cyclonic core extends up to 12 km above the ocean and the whole cyclonic system is carried forward in a westerly direction by the characteristic trade winds. However, in general, the cyclone will be deflected in a parabolic path southwards and along the Queensland coast. If it crosses the coast the cyclone loses its heat and moisture source of the warm ocean and the circulation pattern is rapidly destroyed. If the path is deflected away from the coast the cyclone will be transformed into a major meteorological influence as it travels over cooler waters.

Even though the cyclonic characteristics disappear as the cyclone dies over the land, cyclonic rains quite often continue for some time. Indeed, such rains, with or without the destructive winds, account for much of our annual rainfall.

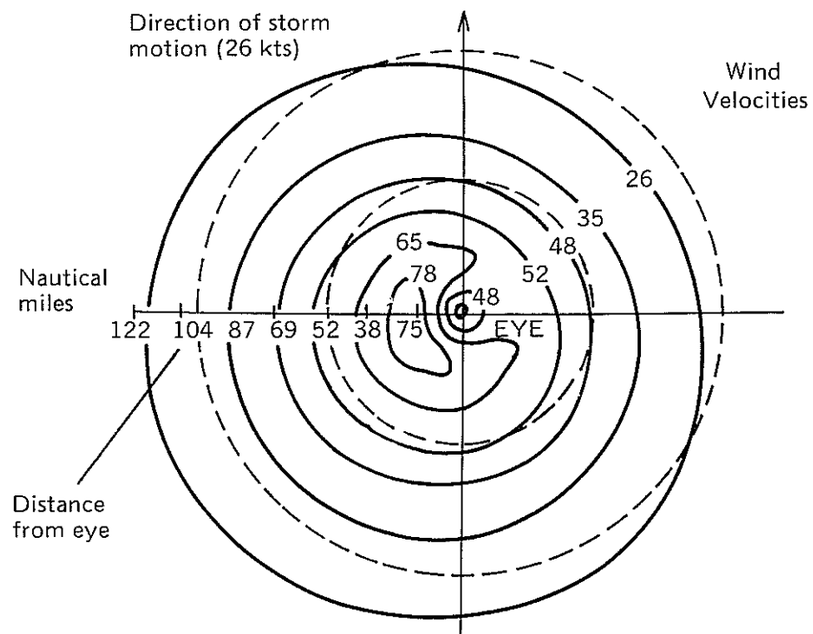
2.3. The Eye

Winds over 74kn can extend over an area of 160 km in diameter whereas gale force winds might be experienced over three times this distance. As the centre of the storm approaches, much stronger winds are encountered so that winds of 100 kn are quite common, whereas 200kn winds have been recorded in the most intense hurricanes. It has been suggested that sustained winds of 113kn (130mph) with monetary gusts up to 156kn (180 mph) could be extreme winds for design considerations along the Queensland coast.

The maximum wind velocity is experienced at the peripherii of the central core or *eye* of the cyclone. This eye usually has a diameter between 16 and 40 km and within the eye wind velocities are less than 15 kn. Above this calm eye intermittent glimpses of blue sky and sunlight can often be caught through light clouds and this is in violent contrast with the thick cloud walls curling inwards towards the core and releasing heavy precipitation which characterise the maximum wind band surrounding the core.

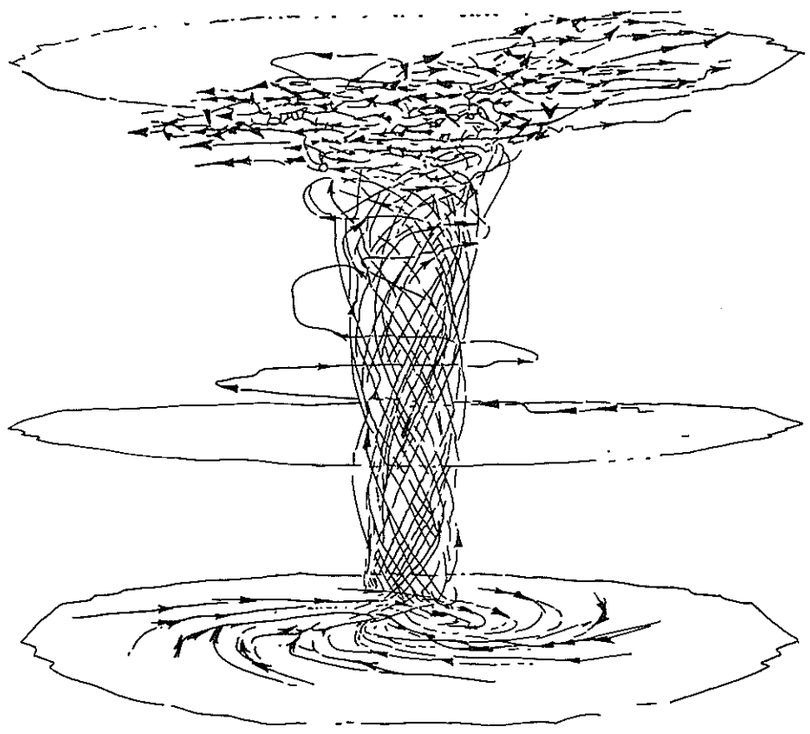
The central pressure at the eye reaches the lowest level and pressures as low as 883 mb (26 in) at Guam 1968 and 894 mb at Matecumbe Key, Florida in 1935, have been recorded. The lowest pressure recorded in Australia is the 915 mb (27in) reading from the 1899 Bathurst Bay cyclone.

The cyclone moves forward, under the various influences affecting it, with speeds in the range 5-30 knots. Generally the velocity of the eye increases as the cyclone moves south. However, characteristically, all cyclones continually and erratically change in shape, size and speed of movement. *Althea* was approaching the coast at about 10knots when quite suddenly it increased its speed to 20 knots and simultaneously intensified.



The surface wind field in a tropical cyclone with a central pressure drop of 62mb. (Peak Velocity = 87 kn)

FIGURE 1a.



The vertical structure of a tropical cyclone
FIGURE 1b.

2.4. Floods — Waves — Surges

Cyclones involve enormous transactions in energy. Thus the condensation heat energy released by a cyclone in one day is of the order of 300-20 megaton hydrogen bombs, or sufficient energy, if converted into electrical power to supply the needs of the United States for six months.

It is, therefore, not surprising that cyclones have been associated with many of the major natural disasters that have occurred. These disasters appear in the form of wind destruction, floods and heavy seas with storm surges.

2.5. Floods

Floods produced by cyclonic rainfalls can be more destructive than the winds. Rainfalls of 150-300mm are quite common and such falls are generally extremely beneficial and provide much of our natural and agricultural wealth. On the other hand, excessive rainfalls up to 900mm per day have accompanied some of our cyclones with widespread flooding and havoc. Cyclone *Ada* in 1970 produced more than 860mm in 25 hours. Floods in the U.S.A. and West Indies that have been triggered by hurricanes have accounted for thousands of deaths and billions of dollars of damage.

2.6. Waves and Surges

Whenever a tropical cyclone passes close to or crosses the coast, it produces a storm

surge; however, only occasionally does it unleash its full lethal intensity. The greatest natural recorded disaster in history was the deadly Bay of Bengal cyclone — which swept into the Bay of Bengal in November 1970, and carried with it about 300,000 people although unofficial estimates run as high as 500,000 dead.

Over the deep ocean, waves generated by the cyclonic winds may reach heights up to 15m or more; beneath the storm centre the drop in barometric pressure causes the water surface to rise in a mound (like water sucked up by a giant straw). This *inverted barometer effect* causes a peak rise of about 0.3m if the pressure drop is 30mb. Very often the presence of the cyclone can be determined up to a day before its arrival on land by sea swells emanating from the storm.

As the cyclone carries this mound of water towards the continental shelf the high wind stresses on the surface of the water, the changing depth of water and friction on the ocean bed, combine to form a long wave motion which causes the surge height to grow to many times the *inverted barometer effect*.

Thus, an advancing storm surge of 6.0m or more can be superimposed on astromomical tides, and in turn, wind induced waves are superimposed on the surge. This build-up of water level can have frightening consequences, particularly if the time of landfall of the cyclone is coincident with normal high tides.

Because many of our coastal centres of population have surburban areas lying 3-6m above high tide levels and because the frequency of these combined disastrous levels of the sea is relatively small, it is quite often difficult to convince people of the potential hazards.

The profile of a typical surge along a straight coast is given as Figure 2. It should be noted that the left-front quadrant of the approaching cyclone is the position of the peak surge whereas on the right-front quadrant a decrease in water level may be induced by the off-shore winds. These surge heights will not all occur simultaneously; the arrival of the peak or low at any point will depend on the structure of the cyclone and on the configuration of the coastline. If the surge is forced up a narrow channel, a *bore* effect will be produced. The most damaging angle of approach appears to be slightly greater than 90°.

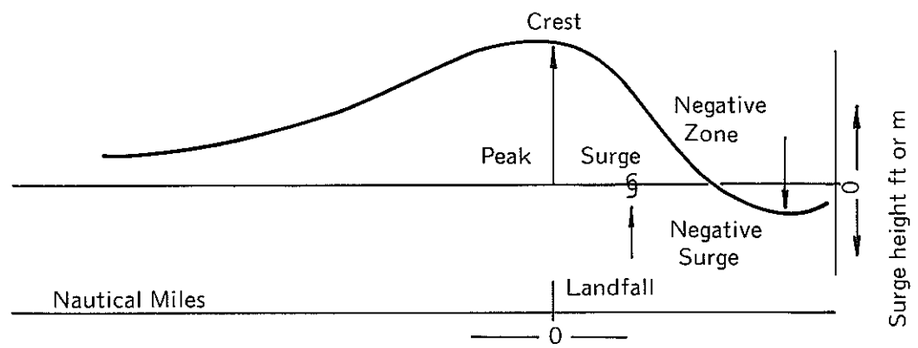


FIGURE 2. — The Storm-Surge Profile indicates the height that the water will attain at various distances from the Peak-Surge point along the coast at the time of Landfall, looking towards the land.

The surge associated with *Althea* reached a peak some 32 km north of Townsville at Toolakea, whereas, the recording in Townsville (Figure 3) shows a surge peak of 2.9m. It should be realised that the surge is not just a wave lasting a few minutes; it is a massive movement of water (like a big tide) which lasts for several hours and, depending on the coastal topography, will penetrate several miles inland.

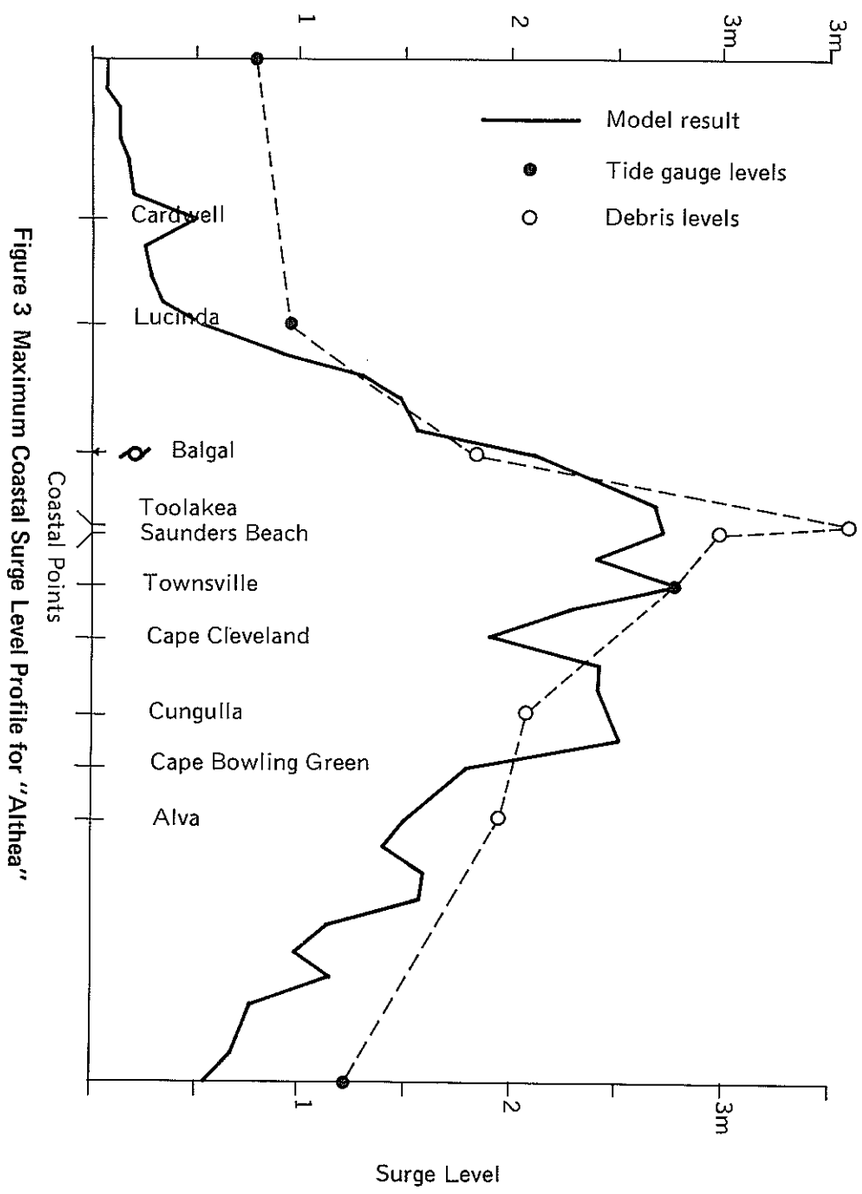


Figure 3 Maximum Coastal Surge Level Profile for "Althea"

Figure 3 shows the resultant maximum surge heights of *Althea* as measured on various tide gauges, as determined from studies of debris and water levels in the immediate post-cyclone period (see *Althea* Report Part II) and as calculated in the simulation runs of *Althea* using *SURGE*. Fortunately for Townsville the surge occurred only 70 minutes after low tide so that although the surge height was almost identical with that of the 1970 Bay of Bengal cyclone which hit at high tide, the combined tide height and surge height was considerably less with *Althea*.

Table 1 gives details of a number of cyclones for which surge levels have been recorded. The Bathurst Bay cyclone was most devastating and resulted in the loss of 307 lives including the destruction of a complete pearling fleet. A similar pressure of 915mb has been attributed to cyclone *Joan* in Western Australia in 1975. It appears likely that some of the surge heights (e.g. Bathurst Bay) referred to in Table 1 could have included waves superimposed on the cyclonic surge.

Year	Cyclone	Pressure (mb)	Surge (m)
1899	*Mahina* Bathurst Bay	915	14
1918	Mackay/Rockhampton	940	3.6-5.5
1918	Innisfail	945	3
1923	*Douglas Mawson*	983	7
1931	Brisbane	983	0.9
1934	Port Douglas	983	1.8
1956	Townsville	966	0.9
1958	Bowen	969	1.5
1964	*Audrey* Bowen	973	4.6
1971	*Althea* Townsville	953	2.8
1974	*Tracy* Darwin	945	1.6
1976	*David* Yeppoon	980	1.0

TABLE 1. Some Notable Storm Surges in Australia

3.0. SIMULATION OF STORM SURGES:

The storm surge developed by a particular cyclone can be modelled by solving numerically the appropriate hydrodynamic equations. At James Cook such a model, which has been named SURGE, has been developed by Mr B. Harper, Dr R. Sobey and myself. The model is based on a leap-frog explicit finite difference approximation to the long-wave equations with wind shear and pressure forcing induced by the nominated tropical cyclones.

The model can simulate any set of coastal features, off-shore bathymetry, islands and reefs. The properties of the cyclone can be varied at any time so that the solution is obtained for a given cyclone approaching and crossing the coast which could occur over an extended period of say 12 hours. The output gives surge water levels throughout the modelled area (which can cover say 200 n. mile x 150 n mile) at each specified time step which may be as small as 1 minute intervals. Flow patterns, velocities, water level histories at particular locations and water level profiles at different times can also be produced automatically.

3.1. Penetration Inland of Surge:

Accompanying any surge there are always large wind driven waves and swells. These will generally cause excessive damage to the shoreline as the wave heights might well be greater than the accompanying surge.

Fortunately however, the wave and swell frequency is generally short, 5 to 12 per minute and their wavelength is also short so they do not tend to penetrate very far inland. However, the storm surge itself lasts for quite significant times — of the order

of hours — and, has an effective 'wavelength' of many miles. As a result surges may penetrate inland in low lying and swampy areas for two to three miles.

3.2. Protection-Front Line of Defence

The passage of a surge inland can be considerably curtailed by effectively increasing the frictional resistance of the path travelled. Long term planning should aim at preventing the destructive passage of the surge by providing 'planned parklands' along the shorefronts. Indeed, a subsidiary advantage of this policy might be the stabilisation of the sea front against long term erosion. Complete clearing of shorefront areas to 'get a better view' should be carefully controlled. Siting of residential areas in exposed and low lying localities should be discouraged.

A second-line of defence is recommended also on a long term planning basis, viz. only adequately designed concrete (or steel) structures should be allowed along the coastal promenade behind the 'planned parklands'.

4.0. RECOMMENDATIONS AND CONCLUSIONS:

I have presented these recommendations in a number of places but I feel they are well worthwhile repeating.

Cyclones are natural phenomena which can wreak untold havoc in communities which are unprepared. If adequate precautions and carefully detailed planning are undertaken on a long-term basis and if civil defence organisations are alerted to cope with emergency evacuation plans then there need be no unnecessary loss of life in the event of even the most intense cyclone.

Extensive monitoring of the meteorological behaviour of the environment is essential for adequate advance warnings of cyclone development. The Bureau of Meteorology has an elaborate network established for this purpose. Advance information is transmitted from orbiting satellites and computer-modified to include geographic co-ordinates and landforms. More local information is monitored by a string of radar stations strategically situated along the coast and a number of other reporting stations all of which forward data to the Tropical Cyclone Warning Cetnre in Brisbane.

In the United States, since 1943, an intrepid group of pilots and meteorologists known as Hurricane Hunters have been using aircraft equipped with a variety of sensors and meteorological detection instruments to investigate and measure the properties of developing hurricanes. At times these pilots penetrate the dangerous winds of the storm.

It would appear highly desirable to use some aircraft spotting and monitoring of our cyclones so that accurate information is available for the prediction and forewarning of landfall and surge positions. This information is essential if civil defence organisations are to fulfil their role effectively. Earlier this year, we were visited by representatives from NOAA — the National Oceanographic and Atmospheric Administration in the United States. It is to be hoped that this visit will result in some collaborative exercise in which U.S. planes and personnel will monitor some of our cyclones.

Installation of a more extensive network of tide gauges, with telemetering facilities, positioned along the coast and off adjacent islands and the reef is currently under consideration. Such a network can give advance warning if strategically placed but equally important is the detailed monitoring of cyclones and surges that would be possible.

If the characteristics of a cyclone can be relayed in sufficient time to enable the SURGE model to run, detailed and adequate warnings can be given to coastal authorities and civil defence organisations.

At some time in the future a surge of the order of 7m can be expected along the North Queensland coastline. These surges will be superimposed on the expected tide levels and cyclonic wave action will further add to the actual water heights. The surge can persist for a number of hours and is capable of penetrating several miles inland in low lying areas.

Long term planning policies must include suitable building standards. Essential services must be capable of withstanding the most extreme conditions, and adequate emergency and civil defence programmes should be developed and tested in advance.

Development in low lying coastal areas should be restricted if possible and where development has already occurred, evacuation programmes to cope with various surge levels should be prepared and incorporated in the emergency plans.

Planning to minimize the penetrating power of surges is desirable. This requires adequate protection against shore-front erosion. Buildings permitted along the coastal fringe should be properly designed concrete structures capable of withstanding surges, and of providing adequate refuge for people trying to escape the fury of a cyclone and its associated surge.

The damage caused by cyclone 'Tracy' has been estimated as approximately $300 million and a number of other cyclones have also imposed heavy financial costs and loss of life. It should therefore, be obvious that positive steps must be taken to acquire a better understanding of the mechanisms of cyclones and the characteristics of their associated surges and practical measures must be implemented to minimise the toll of one of nature's greatest forms of destruction.

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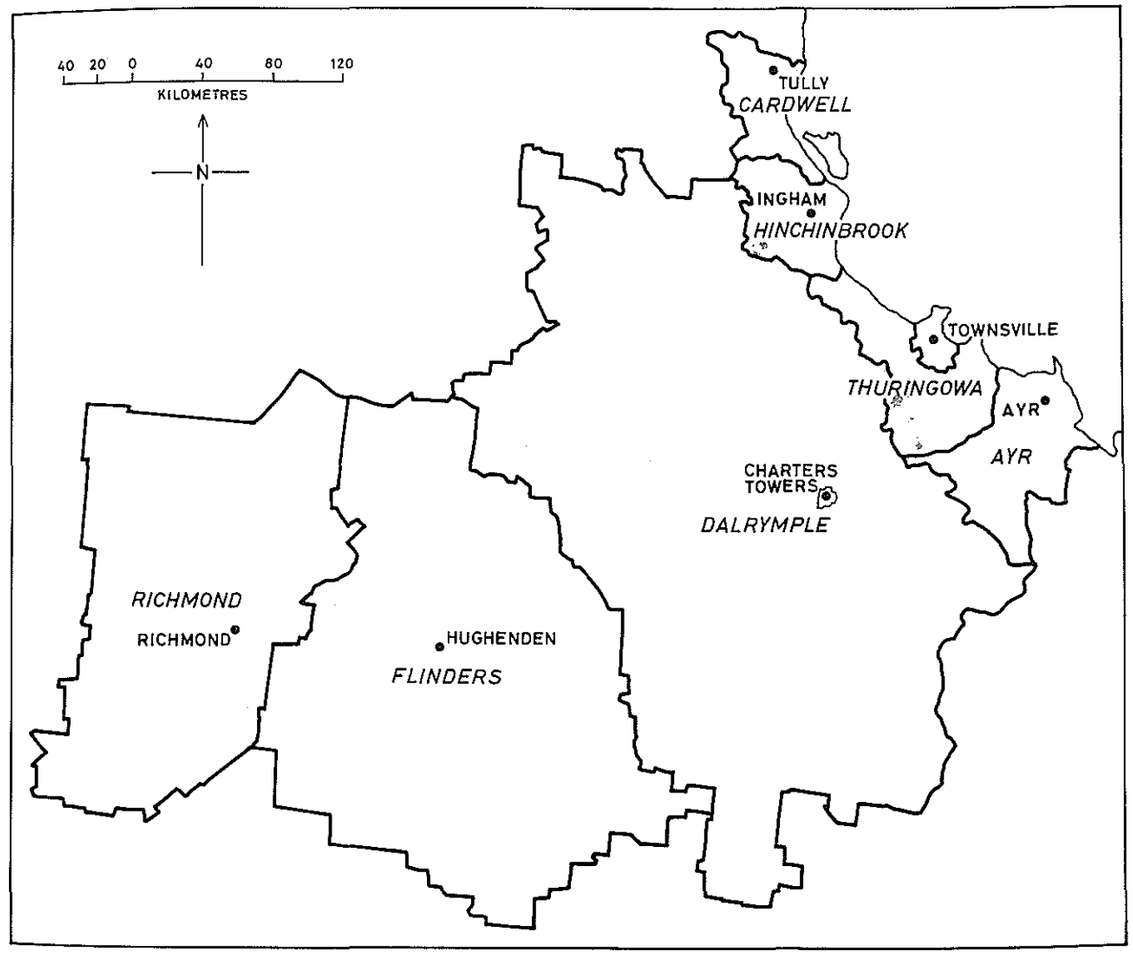

Townsville Disaster District of the Northern Region
(State Emergency Service)

COMMUNITY PREPAREDNESS : NORTHERN REGION, S.E.S.

John Jones

Major disasters occur with frequency about the Earth: statistics indicate a frequency of one every twenty days.

Townsville is located in one of the most cyclone-prone areas on the Queensland coast. Naturally, the emphasis is on preparing the community to live with and deal with cyclones. This is carried out by (a) organizing community counter-disaster educational programmes, and (b) by training communities in counter-disaster methods.

The State Emergency Service believes in the concept of maximum community involvement. It is not the task of individual organizations, either statutory or non-statutory, to mount counter-disaster programs in isolation. The basic principle in combating the effects of disaster is that the community as a whole must be involved.

What are the governments doing to prepare communities to cope with disasters?

The Australian Federal Government has a well prepared National Disasters Organization, located in Canberra, and headed by Major-General Stretton. The Australian Government also conducts a National Emergency Service College at Macedon in Victoria, where courses on counter-disaster strategies are conducted throughout the year. The students are drawn from all states: on returning to their communities, they pass on the knowledge they have gained. This is one way in which community preparedness is gradually taking place.

The Armed Services have special units trained to deal with disaster, and work with communities in lessening the effects of various types of disaster.

Universities are undertaking research into many aspects of disaster, for example, the designing of structures which will withstand cyclonic winds, and research into storm surges.

The Queensland Government introduced the State Counter-Disaster Organisation Act in 1975. The Act sets up twenty-six Disaster Districts, each headed by a Disaster Controller. Provision is made in the Act for each local authority to furnish to the appointed Disaster District Controller a counter-disaster plan for the local authority area.

The Act also provides for the declaration of a state of disaster by the Disaster District Controller on approval of the Minister. This gives the State Government wide powers in combating the effects of disasters. Australian Government can be called on in the area

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Sen.Sergeant John Jones: Regional Operations Officer for the Northern Region of Queensland State Emergency Service January 1975 — March 1978 was involved in preparing communities in the area from Townsville, north to Tully, and west to Julia Creek for any type of disaster eventuality. He has been working on preparation of data for the State Counter Disaster Organization and the State Emergency Service. Has attended courses at the National Emergency Service College, Macedon, Victoria. Admitted as a member of the Australian Institute of Emergency Services.

of finance, materials, and manpower, to be made available to the disaster area so that the community may be returned to normal life as quickly as possible.

The primary object of the State Emergency Service is to save life, and secondly to help reduce personal suffering.

You may ask whether the governments are doing enough in preparing the community before disaster strikes. Are the scales tipped too heavily on the other side; dealing with disaster after it has occurred? Is too much expertise being concentrated on the after side? Should there be more planning before the storm?

I consider that prevention is better than cure, and I would suggest that a great deal is being done in community preparedness, and that the government is aware of the need to have an informed, alert and educated community.

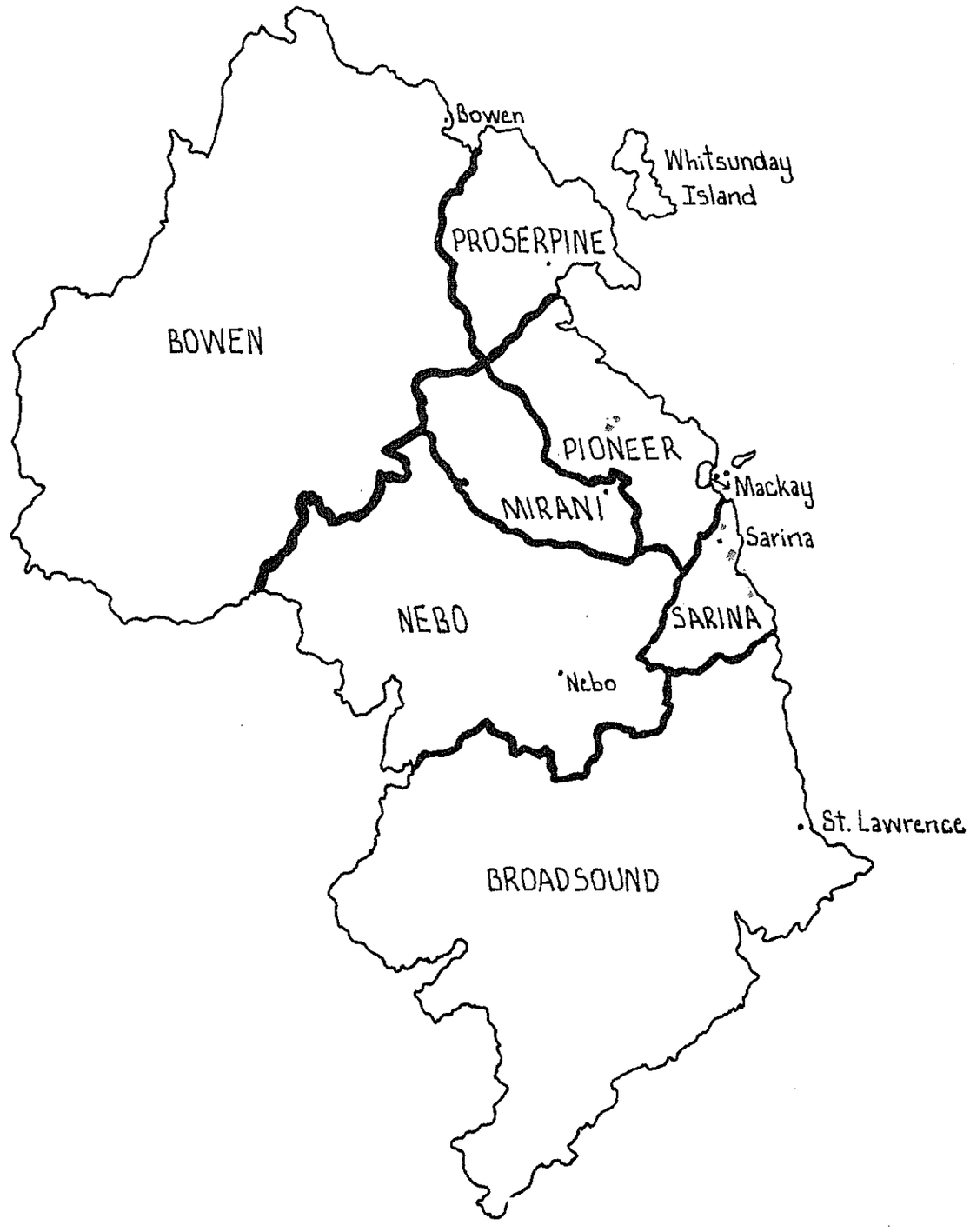
Volunteer members of the community train throughout most of the year at the Townsville headquarters of the State Emergency Service. During the past three years, several hundred volunteers have passed through our headquarters training scheme in Townsville. Field exercises are conducted periodically.

You have heard from speakers today, telling us what has been achieved of benefit to the whole community.

The lessons of disaster are:

1. the threat is always present.
2. effects vary mainly in degrees.
3. self help must be encouraged.
4. the community must have resources ready to assist.
5. co-ordination and control are essential.
6. knowledge of what to do and how to do it is essential.

A community or a city is restored to its normal way by the combined efforts of the government and the people. When I think of community preparedness, I think in terms of safeguarding human life, for this is the most precious commodity we have.



AREA MAP: Mackay Disaster District. The Disaster District Co-ordinator is the Inspector of Police, Mackay Police District.

MACKAY COMMUNITY : PREPAREDNESS FOR A DISASTER

Ronald S. Watson

My given subject for this address is Community Preparedness for a disaster as it relates to Mackay District or in other words 'How we will cope'. I believe that the worst thing that a community can do with regard to the preparedness for a disaster of any kind is to believe that the authorities, the proverbial "they", have everything under control and there is nothing for them to do and nothing to worry about.

The community has to be educated and made aware that the best and quickest way to get back to some semblance of normality and order is, theoretically speaking, to pick itself up by the seat of its pants. The basic concept in this is one of self-help and mutual assistance within each community. Prior to, during, and after a disaster, maximum use must be made of the communities' voluntary organisations in the field of welfare, first aid and communication in order to reinforce the resources of the statutory services. This concept involves the preparation in advance of measures which will protect the community when the disaster strikes, with its main purpose being the prevention of loss of life and personal suffering. The Queensland State Emergency Service is just one body which has been established by the State Government with the emphasis on the following principles:- on training, on leadership, on co-ordination and co-operation. The idea is that volunterrs are trained in these areas and they can then be called on in times of disaster and emergencies. This relieves the statutory bodies to carry out tasks which only they can handle. In other words, the community itself provides extra manpower through such voluntary bodies as the State Emergency Service, the Red Cross, the Salvation Army and others, to assist with the first aid, rescue and welfare. Relatively minor tasks which are normally carried out by such bodies as ambulance, fire brigade and police can be handled by supervised volunteers, thus allowing the statutory bodies to concentrate their efforts on more pressing and more important tasks.

The main consideration in this idea of self-help is to get the community back on its feet quickly.

Psychologically it is most important and very necessary in disaster situations to have individuals and groups (such as the family group) actually doing something, instead of milling about like lost sheep or sitting somewhere brooding about the whole matter.

Whilst on the subject of volunteers I would like to quote from the opening editorial of the magazine 'Emergency', No.6, 1977. "Professionals need to be tolerant toward recognized volunteers, and the authority of the professionals as well as their day-to-day expertise has to be reciprocated by the volunteers. Likewise all recognized services have to know how to accept help, when offered by the non-recognized members of the general public who will often rush to help when a crisis is on. When assistance is not needed we should learn how to tactfully turn the offer away, but we often create the feeling of not being wanted, and this jeopardises future offers of assistance when it may be needed most.".

Senior Constable Ronald S. Watson, Police Officer, Communications Branch, Mackay Police, Signals Instructor for State Emergency Service, Search Master for Mackay Sea Rescue Squad, involved in counter-disaster work in Mackay area since 1968.

In Mackay district, the overall control of operations in the event of a disaster within this district is in the hands of a Disaster District Controller who is the Inspector of Police. This position is established under the State Counter Disaster Organisation Act of 1975. To assist him, the Inspector has a District Control Group which is made up of those persons in the District who, it is considered, can be of greatest assistance to the Inspector, as the District Controller, in assessing various situations and putting forward proposed action to deal with whatever problems come to hand. Of necessity, this group is kept small in number, and the Inspector, in addition, is able to call on other persons as required to give assistance. The control group assists the District Controller in making decisions as to priorities, who should handle the matter, and what further assistance will be required. Obviously, it is not intended that the Inspector should tell individuals or groups how to do their particular job, but simply to tell their representatives what is required of them under the District's Counter Disaster Plan.

Mackay District Control Group of the State Counter Disaster Organisation has drawn up a counter-disaster plan as part of the community preparedness in case of disaster. It is hoped that this plan will ensure a more efficient and smoother operation in the event of a disaster than could be expected without such a plan. If there seems to be a note of doubt in that remark, it is not because I doubt the effectiveness of the plans and the standing orders, or the ability of those who must carry them out. Rather it is doubt in the uncertainty of what unforeseen problems the disaster (whatever it is) might bring.

The Counter Disaster Plan is an overall outline of arrangements for the whole of the Mackay Disaster District, which is roughly bounded by the townships of Bowen, Collinsville, Dysart and St Lawrence. The plan is further broken down into counter-disaster plans drawn up by each local authority for their respective areas. For this purpose, Mackay City and Pioneer Shire have agreed to join forces. There are standing orders drawn up by the various groups within Mackay disaster district, and so we have a medical plan, we have a Harbours Board plan, we have plans and standing orders from the Railway Department, from the airport, from the sea rescue squad, from welfare groups and so on, and also standing orders for particular emergencies, for example, a major rail disaster, aircraft crash on or off the airport, or major fire at the harbour.

To ensure that there is co-operation between authorities or their representatives and the community, the general public has to be kept informed as to what is happening, what the nature of the emergency or the disaster is, and what is required of them. The obvious way to have this information given to the public is by the local media, by the radio and television stations and the press. Therefore, there has to be a good liaison between the Local Control Group and the media, and for this reason the District Controller has direct telephone lines from the switchboard at the Mackay Police Station to local radio station 4MK and also to the ABC.

One group of people who need special attention with regard to being kept informed are the strangers and visitors to our district. It is hoped that through the media these people can be advised what action should be taken by them before, during, and after an emergency or disaster. The information which is broadcast should not be such as to cause panic and fear, but rather that which will let these people be assured that the authorities are in control of the situation as far as is humanly possible and that the community in general has prepared plans to deal with the particular disaster at hand. As I previously stated, our local community should be aware that counter-disaster plans do exist and they should be educated and encouraged along the line of the basic concept of self-help during an emergency or disaster. It is encouraging to see private enterprises entering into Public education programs in various ways: one which particularly comes to mind is on cyclone preparedness information which our local radio station 4MK broadcasts during the cyclone season each year.

Now, I agree that some material, previously used by various organisations could perhaps only help to create panic and fear in relation to our cyclone season. But I could not agree that to keep the public ignorant of the nature and the effects of cyclones is an

intelligent move. Whatever form the disaster or emergency may take, surely the public will be able to help themselves and the authorities more effectively if they have been educated and advised along these lines.

The concept of self-help cannot succeed unless this is carried out. The aim of the Mackay District Counter-Disaster Plan is to outline arrangements to counter likely disasters and emergencies in the Mackay Disaster District. The likely threats which are covered are cyclones, storm surges, floods, major fires, bush fires, transport accidents which include passenger aircraft, passenger trains, buses and shipping. The District Control Group includes the District Controller who is the Inspector of Police, local authority representatives, local authority engineers and then a host of other people from various fields, who are experts in their field and who can be called upon by the Inspector or by those assisting him.

The District Control Group must have at its fingertips the sort of information needed to assist the Group in a disaster situation, e.g. what resources are available? Do we know what we have in the area? That is, not only in *material*, but do we know what we have in *specialist manpower*. At the Mackay Police Station we have an *Emergency Information cabinet*. I have been gathering this information over the years concerning what materials and resources are on hand. Of course, none of the lists are any good at any time unless they are *updated*. So if you have a list of information at the Police Station and you haven't updated it, I would ask you to do so.

What do we have around the place in specialist man power? We need to know these things. I am not talking about the Police Force needing to know. I am talking about the District Controller and the Control Group needing to know. Professor Oliver said we allow the problem to come and then we react. Isn't this so much the case? But we have through this Counter Disaster Plan the ability to get over as many problems as quickly as possible, and to a certain extent, we are prepared before the event occurs.

Flood surge maps are held at the Police Station. They show three stages or levels of water intrusion, and these, read in conjunction with the information forwarded from the Meteorological Bureau, Brisbane, will assist the Local Control Group in deciding whether or not any particular area should be evacuated. Final approval for such a proposed evacuation must come from the Central Control Group, in Brisbane.

"Who is responsible for recording names and so forth?" The Red Cross is responsible for records kept. They work through and with the SES, along with the Salvation Army and others. But the Red Cross is responsible for the recording of names, this is accepted Australia-wide.

What is available in the area for use as additional or back-up communications? C.B. operators could be used in an emergency situation *providing* they were organised and were prepared to come under the direction of the District Controller. Local taxi companies and businesses with two-way radio systems could be used, but it is essential to know who they are and where they are located.

Certain halls within the Mackay area have been defined as being suitable for use in the event of a disaster. However, constructional engineers or building inspectors need to check these halls before use to approve their serviceability and structural soundness.

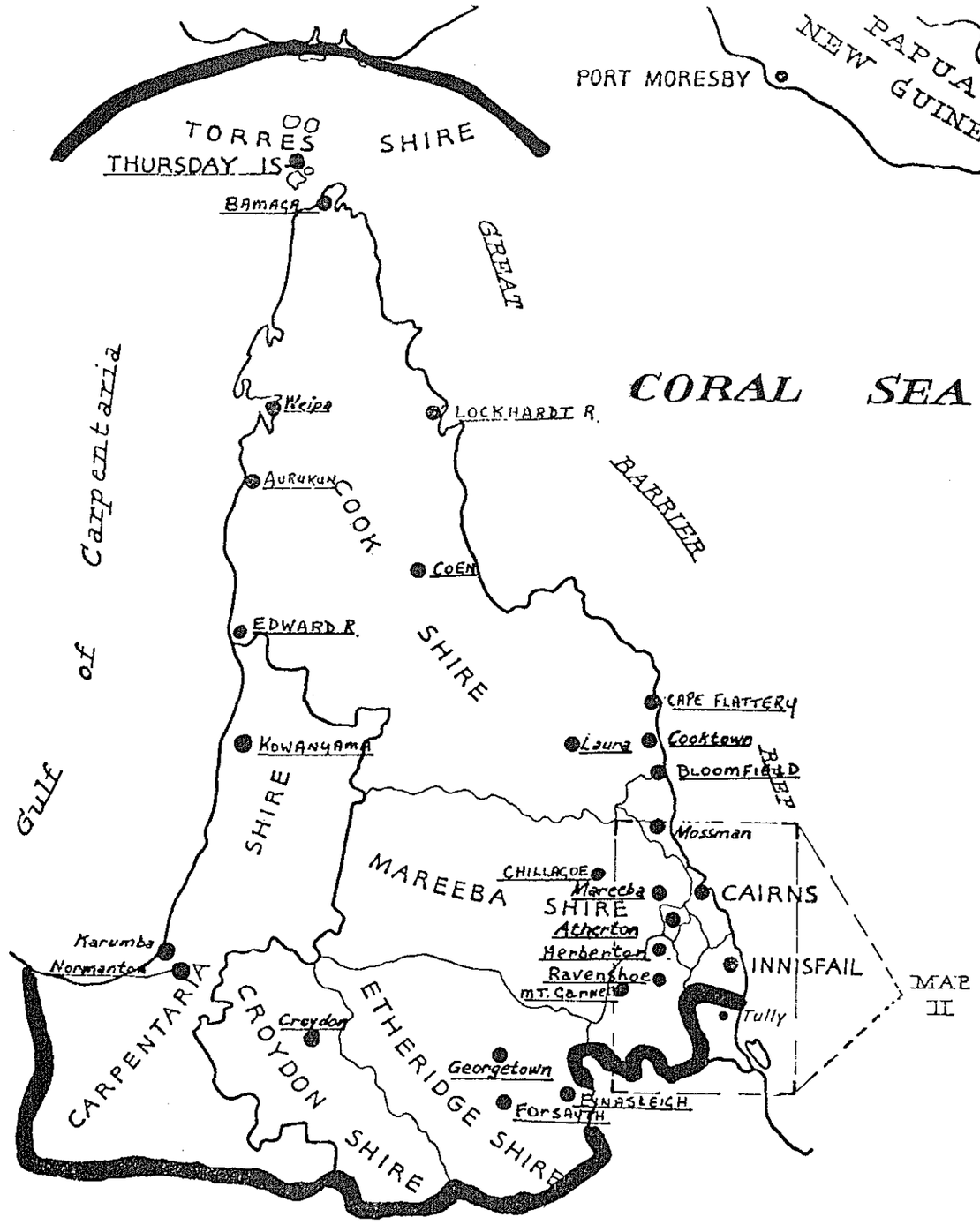
Under the State Counter-Disaster Act, 1975, each Local Authority within the Mackay District is responsible for the drawing up of counter-disaster plans and standing orders for their own area of jurisdiction. These plans must then be approved by the District Controller.

Such plans must be kept up-to-date and improved and modified where weaknesses show up. These weaknesses will only become evident by conducting exercises to prove the plans and standing orders as being practical and workable.

Weaknesses would also show up in the actual disaster, but naturally, the District

Controller would prefer to avoid this as much as possible, not only to save embarrassment, but more importantly, to have the counter-disaster work carried out more effectively and efficiently, with minimum loss of life and injury to person and property.

Implementation of the counter-disaster plans of the Mackay District is in the hands of the Disaster District Controller and his District Control Group. The measure of this community's preparedness for a disaster will be seen in the effectiveness of the counter disaster plans as they are used before, during, and after the event.



Area covered by Regional Operations Officer, Far Northern Region: Disaster Districts of Cairns, Mareeba, Innisfail.

COMMUNITY RESPONSE IN DISASTER : FAR NORTHERN REGION

Des Spiller

When considering the procedures of arousing community response to cope with natural disaster situations throughout the Commonwealth of Australia one of the major factors to overcome is that of "apathy" (lack of interest of involvement) of a large percentage of the community concerned.

It is to be noted that in areas with frequent emergency situations such as flood, cyclonic disturbance or fire, the local communities are prepared to meet such emergency and have prepared counter disaster procedures to cope with most emergency situations.

We are aware that natural and other disasters occur all too frequently throughout the entire world and in most instances are unpredictable and no communities are exempt.

We look at Cairns and adjacent areas and to the far northern region extending from Tully north to the New Guinea border and west to and including Karumba.

Statistically on information supplied by the Bureau of Meteorology the area of coast-line between Innisfail and Cooktown is one of the highest for cyclone effect within the Commonwealth.

We can say that Cairns City, Mulgrave, Douglas and a portion of Johnstone Local Authority areas are unique in that due to the western barrier of high mountain ranges, and flooded road systems, evacuation of residents from large areas of surge-prone coastal plains, to unaffected areas would be impossible and would be restricted to immediate disaster-affected adjacent areas. Road and rail access is frequently cut in almost every wet season and flood emergency and airport facilities could be restricted to helicopter use only.

In addition, Green Island tourist resort could be seriously affected due to its height above sea level and evacuation of the entire population of this island must be considered.

"Community preparedness" and requirements do not centre around Cairns, as there are numerous isolated centres of population including Aboriginal communities throughout the whole Cape area with no possibility of immediate outside assistance, some with little or no external communications. Some are fortunate to have either Department Aboriginal and Islander Advancement Royal Flying Doctor Services or S.E.S. radios. Access to quite a number of these settlements particularly during the wet season is restricted to aircraft (when airstrips are operational) and/or by sea craft when conditions permit.

In the majority of these communities the majority of residents are *prepared* to assist as they are aware of their isolation and the necessity of team operation to save life. I see in areas such as these a required desirability to assist in improving their counter-disaster procedures and improving their communications with their nearest centre of assitance. The

Sergeant Des Spiller — Regional Operations Officer, Queensland State Emergency Service, covering area — Tully to Karumba, and north to F.P.N.G. Border, including Torres Islands and D.A.I.A. Communities, for all disaster procedures. Responsible for co-ordinating State Emergency Service groups within the Far Northern Region. Has attended National Emergency Services College, Victoria.

mere fact that isolated communities, and for that matter any community in distress, has contact with and assurance from areas capable of assistance, has a definite psychological effect on that population in time of need.

We are aware of the Queensland State Government and Federal Government's participation in counter-disaster preparedness and disaster procedures, certain aspects of which are the involvement of the Queensland State Emergency Service throughout Queensland with a large percentage of communities with active and involved State Emergency Service groups and equipment manned by very capable volunteer personnel trained in counter-disaster procedures at the Australian Counter-disaster College, Macedon, Victoria, or at local level by these trained personnel.

Throughout Queensland each local authority is responsible for formation of and functioning of viable State Emergency Service groups throughout each local authority area. The State Counter-disaster Organisation Act and Regulations of 1975 clearly define requirements and procedures.

All State Counter-disaster Procedures have a back-up of the Armed Services when necessary, however, prior to involvement of the Armed Services there is a necessity and availability in each community of numerous welfare organisations capable of untiring effort in any emergency situation. I here refer to specific organisations and private citizens who always are available or offer their services in time of need. Unfortunately, in many instances as a residential population increases there is not a proportionate increase in "community preparedness". These people who assist are "prepared"! They seek out the counter-disaster information required in order to protect themselves and others in an emergency no matter whether the community is frequently affected by disaster or not.

Ladies and Gentlemen, our major task, next to ensuring that our community has an efficient and effective Counter-disaster Plan, is motivation of the general public in self-help and mutual assistance to become involved in counter-disaster preparedness. There is an unfortunate attitude that can be related to almost every emergency situation involving mankind and I would hate to think that it is restricted to this area and that is the attitude:

A. "It will happen to someone else!"
B. "It won't happen here." or,
C. "We'll worry about it when it comes!"

This apathy can be related to several aspects, some of which I refer to include:

Ignorance of information
Lack of threat
Lack of leadership
"I don't want to know" attitude (disasters are unpleasant)
Role conflict within a community ("I won't work with him")
Failure of community leaders to delegate responsibility
Lack of organisational ability

Past experience has clearly indicated necessity for techniques in developing preparedness and I refer to: *passive* and *active* means.

Passive means are essentially impersonal, institutional, and formal, such as:

News articles
Press releases
Pamphlets
T.V./ Radio talks and advertising
Visits to schools and 'should' invite further inquiries.

Active means relate to face to face contact.

Motivation of leaders
Training of volunteers
Involvement of community groups and clubs
Public education, displays and exercises.

In active operations there is a necessity to emphasise:

A. Advantages of preparedness over unpreparedness.
B. Maintenance of interest and discussion within the values and capabilites of community.

It is to be appreciated that in a disaster situation there is a necessity for involvement of a majority of trained personnel, trained in procedures and requirements of the local authority counter-disaster plan. However, there is a definite necessity for the residential population to be aware of procedures and requirements relative to their residence and residential area.

To encourage effective community preparedness and involvement perhaps motivation should be developed on the following lines.

1. Appeals to self interest outlining procedures for protection of life and property.
2. Appeals to community interest by involvement thus self-guarding their assets.
3. Appeals to status in community through involvement in counter-disaster procedures.
4. Appeals to personnel with management or leadership capability.
5. Appeals to acceptance of responsibility within community of counter-disaster preparedness program.

We are attempting to overcome the majority of inefficiencies in our counter-disaster procedures and community preparedness to meet such emergencies. The ultimate cannot be achieved overnight and unfortunately efficiency has frequently resulted from information received from de-briefing after major disaster situations.

We are extremely fortunate to now have State Emergency Service groups throughout the whole of the Innisfail, Cairns and Mareeba disaster districts — men and women who are volunteers in a cause to prepare their communities should disaster strike. The present S.E.S. membership within Cairns disaster district extending from Babinda north to and including Cook, Douglas and Torres Shires now stands at 700. Mareeba disaster district including the Tablelands local authority area and local authority areas of Etheridge, Croydon and Carpentaria stands at 116. Innisfail disaster district including local authority areas of Johnstone and Eacham Shires now stands at 124.

These volunteers are but a very small proportion of the entire population, however with continued encouragement, assistance and recognition of their capabilities, and the capabilities of all co-ordinated welfare services I feel that we are well within sight of our major objective of "community preparedness", throughout this far northern region.

Cairns Disaster District

Cairns City and Mulgrave Shire areas of operation including Cairns and all Northern Beach resort areas and south including centres of Edmonton, Gordonvale, Aloomba, Babinda and coastal resorts.

Douglas Shire including headquarters at Mossman and communities of centres of Daintree, Newell Beach, Port Douglas and Cape Tribulation.

Cook Shire including Shire headquarters of Cooktown, Bauxite mining centre Weipa, Community centres of Coen, Laura, Bloomfield and Aboriginal Communities of Bloomfield, Hopevale, and Lockhardt River, South Weipa and Aurukun.

Torres Shire including all Torres Strait Islands under control of Torres Shire and Department Aboriginal and Islander Advancement including Cape York and Bamaga community centre.

Innisfail Disaster District

Johnstone Shire including headquarters Innisfail and centres of South Johnstone, Mena Creek, Silkwood and beach resorts south to Cardwell Shire boundary.

Atherton Shire Tablelands areas with headquarters Atherton and centres of Tolga and Walkerman.

Eacham Shire headquarters Malanda and centres of Milla Milla and Yungaburra.

Mareeba Disaster District

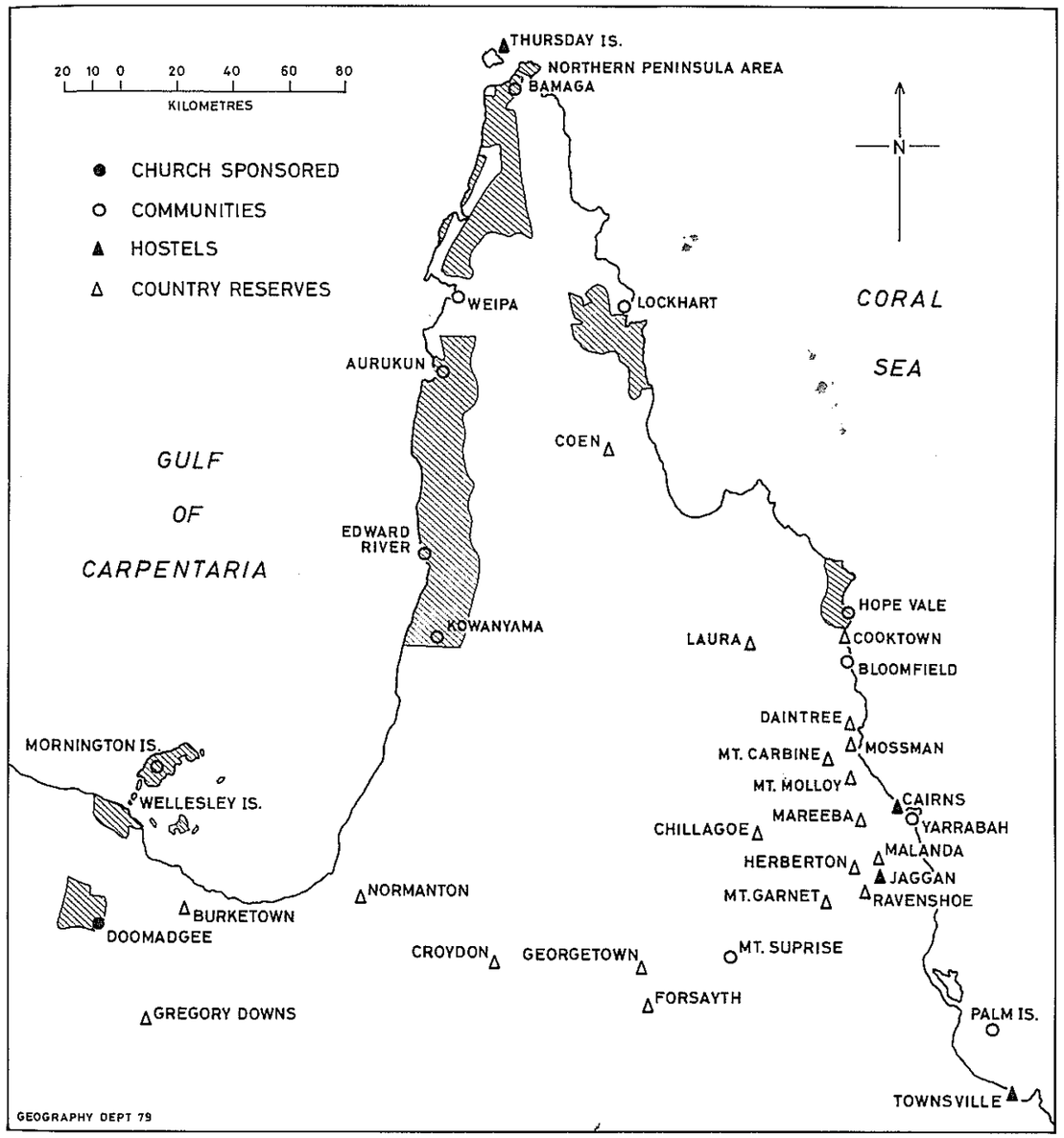
Mareeba Shire with headquarters Mareeba and country centres Chillagoe, Almaden, Dimbulah, and Mt Molloy, Irvinebank and Kuranda.

Herberton Shire with headquarters Herberton and centres Ravenshoe and Mt Garnet.

Etheridge Shire with headquarters Georgetown and centres of Forsayth, Einsleigh and Mt Surprise.

Croydon Shire with centre Croydon.

Normanton Shire with headquarters Normanton and prawning centre of Karumba and Department Aboriginal and Islander Advancement centres of Kowanyama and Edward River.



Map showing Aboriginal and Islander Communities (administered by the Queensland Department of Aboriginal and Islander Affairs) : Incorporated in the Cairns Disaster District of the Far Northern Region of the State Emergency Service.

MILITARY ASSISTANCE TO THE TOWNSVILLE COMMUNITY

CYCLONE ALTHEA

(Data collated by Headquarters, District Support Group North Queensland, Lavarack Barracks, Townsville, Q.)

General

The main centre of Cyclone Althea struck the coast of Queensland 30 miles north of Townsville and swept inland in a west south-west direction impacting Townsville at approximately 10.20 am on 24 December, 1971. As a result of the wind force and accompanying rains, vast damage was caused to roads, telephone and power distribution facilities, warehouses, houses and business premises.

At the commencement of the cyclone, an Operations Room (Control Centre) was established by Army personnel in the Lavarack Barracks area.

After the cyclonic winds had abated, reconnaissance teams were despatched to assess damage to Army owned property and married quarters. All troops, whose homes were undamaged and families safe, were ordered to report to their units and await further instructions.

As the extent of the devastation to the area and the community as a whole became known, the assistance and resources of the Army were offered to the State Disaster Relief Organization, and accepted. As a result, all Army units in Townsville were involved. This total involvement necessitated particular specialist troops being recalled from leave irrespective of their locations. Volunteers from Army Reserve units in Townsville and Ayr were also employed in the task of rendering assistance.

The State Disaster Relief Organisation and the Civil Defence Organisation were established in the Central Police Station, and a communications link between them and the Army Operations Room was established by 4.30p.m. on 24 December, 1971. Army Liaison Officers were assigned to Police Headquarters and to the Civil Defence Organisation.

Priorities for assistance given to the civil community from Army resources were allocated by the Inspector of Police, Townsville.

Townsville

Army units were allocated designated areas of Townsville to clear the streets of debris, place tarpaulins on deroofed houses, assist in the relocation of families, and to promote the spirit of the community. Twelve suburbs of Townsville were allocated to the Army by the Inspector of Police.

A total of 764 regular soldiers and 280 Army Reserve soldiers were employed during the operation. 120 civilian tradesmen from southern cities were accommodated within Lavarack Barracks. Urgently required commodities such as stoves, blankets, mattresses, water sterilization outfits, etc were issued from Army stocks to the State Disaster Relief Organization for distribution to the community.

The RAAF were committed to flying into Townsville from southern cities emergency relief supplies, building materials, and replacement pipes for the damaged Magnetic Island water supply pipeline. Twenty-seven separate transport aircraft flights into Townsville were executed. A further nine flights were made to Palm Island and Ayr. These flights conveyed relief supplies and evacuated personnel where necessary.

Over 2,000 tarpaulins were issued to civil authorities, along with hand tools, bedding, fans, lamps, stoves, etc. The main groups that received these stores were the Civil Defence Organization, Townsville City Council, Salvation Army and James Cook University. Assistance of soldiers and specialist equipment was provided to the Townsville Regional Electricity Board in its endeavour to restore power to Townsville. By 31 December, 95% of Townsville had power. Assistance was also provided to the Postmaster General's Department (Telecom) to expedite repairs and restore the telephone system to operational status.

Five Army Aviation helicopters were based in Townsville at the time. Two were rendered unserviceable during the cyclone. The remaining three aircraft flew a total of 88 hours on reconnaissance, search and rescue, liaison and VIP missions. On 27 December, following an inspection of devastated Magnetic Island, The Premier of Queensland requested the Army to accept responsibility for co-ordinating the relief operations on Magnetic Island. Major assistance was given to this task.

A total of 216 soldiers were deployed to Magnetic Island to assist in the re-establishment of water, electrical and telephone services. Temporary refrigeration, power and community cooking facilities were also provided. During the period of the operation, 274 civil aid requests were actioned, 1,208 truck loads of debris removed, and the Army Social Worker visited 32 cases.

A medical team of four personnel, one ambulance, and various medical supplies were sent to supplement the local medical organization. A total of 371 patients were attended to during the operation. This medical assistance ceased on 4 January 1972 and personnel returned to the Army hospital.

Personnel and stores were transported to Magnetic Island by Hayles Ferry Services. The vehicles and stores transported to the Island are shown in Annex A.

On 6 January 1972 the Army ceased its operation on Magnetic Island and all responsibilities were handed back to the local authorities.

Palm Island

A small Army element was inserted onto Palm Island to re-establish communications with the mainland and provided minor assistance to the repair of damage. Tarpaulins, stoves, rations, fuel and a generator were supplied. Support to Palm Island was completed on 31 December.

Conclusion

By 5.00p.m. on 6 January 1971, all personnel had returned to their units, and the Operations Room was closed down.

MEDICAL PREPAREDNESS FOR DISASTERS : MACKAY, N.Q.

David Charles Bleakley

Introduction:

I have been the medical superintendent of the Mackay Base Hospital since February 1977. At the present time there is no specific cyclone plan existing at the hospital and I have been involved in examining disaster plans for other similar hospitals, with a view to developing a plan for this one. In particular, a plan received from the Port Headland Regional Hospital in Western Australia provides a very good model. My paper is solely concerned with the manner in which the Mackay Base Hospital would manage the medical problems presented by a disaster situation in the surrounding area.

Mackay Hospital is designated as the primary receiving centre in the event of a disaster affecting the Mackay area.

Definition:

A medical disaster situation can be defined as one in which the normal hospital facilities, particularly in the Casualty Department, are either overloaded, or severely depleted. Depletion might be due to absence of staff, or damage to hospital buildings, or shortages of services etc.

In the case of Mackay Base Hospital the sudden arrival of more than six stretcher cases, or more than two cases requiring urgent resuscitation and surgery would in fact begin to overload normal facilities and require some special mobilization of staff and equipment. The Casualty Department is well used to treating major trauma. We in the hospital deal with this kind of carnage daily, and as a surgeon, a large proportion of my work consists of managing severe road accident trauma. In a disaster situation, the problem is not the type of casualty we are likely to receive, but the number of cases which would arrive within a short space of time. The philosophy of medical disaster planning aims at efficient mobilization of all necessary available human and material resources and their utilization, so as to do the most good for the most casualties.

It is perhaps sobering to note that the number of young people and children killed every year in Australia by road accident trauma, would probably considerably exceed the total number of deaths due to so-called disasters in Australia for the whole of the twentieth century. This is not to mention the even larger numbers of severly injured people, who would be permanently disabled. It is rather strange that so much emotional excitement can be generated in the community by the occasional natural disaster, while this largely preventable daily carnage on the road excites very little public interest.

Dr David Charles Bleakley: MB, BS (*U of Q*), FRACS.
Medical Superintendent, Mackay Base Hospital, February 1977 — Medical Officer, Department Public Health, Papua, N.G. 1969. Lecturer, Medical Faculty, U. of Papua, N.G. 1971-4. Senior Surgical Registrar, Christchurch, N.Z. 1975-6.
During his surgical career, Dr Bleakley has had extensive experience in the management of the severely injured. In his present position, he is responsible for the overall medical administration of the Mackay Base Hospital, and in the event of a disaster, the reception and emergency treatment of casualties.

During a major disaster it must be impossible to give normal standards of medical care. It also seems to me to be a contradiction of terms to suggest that a disaster can be so adequately planned for, as to go smoothly. The history of both distant and recent disasters would indicate that the unexpected almost always happens, and that plans almost always break down to some degree in the real event.

It is necessary then, to attempt to predict as many of the variables as possible, and try to have contingency plans, which cover at least all foreseeable situations.

Special Local Factors:

In a town such as Mackay, which is both relatively small and very isolated, there are some major problems, and also in fact, some advantages which could occur in the event of a disaster. (1) Special problems are obviously created by the isolation from outside assistance and the existence of only limited local resources. (2) The advantages that Mackay has over some larger metropolitan areas may not be so obvious, but medically speaking, one could expect that most localising disasters, involving many casualties, would occur within a reasonably close range of the hospital, and would not be likely to create major transport problems which metropolitan hospitals seems to almost invariably face in getting people to and from a disaster site. The airport, for example, is less than five minutes' drive from the hospital, along a road that is unlikely to become blocked at the time of any disaster. This means that most of the emergency treatment of patients could best be delayed for the few minutes necessary to get the casualties to the hospital, rather than sending large teams of staff from the hospital to the disaster site.

Levels of Mobilization:

I have decided to define three levels.

LEVEL 1. A natural disaster involving more than ten seriously injured casualties, which would require full mobilization of all hospital resources.

LEVEL 2. A disaster involving less than ten casualties, requiring partial mobilization of hospital resources and standby of remaining resources.

LEVEL 3. A pending disaster, such as an expected flood, cyclone, or aircraft crash, in which the hospital would need to go into a state of stand by.

Notification of Emergency:

Notification normally comes to the hospital through the hospital switchboard, or in the case of an airport disaster, through a direct line to a special red phone in the medical ward. The first person to receive notification of the disaster, immediately informs the medical superintendent, the nursing superintendent and the hospital manager, or the respective deputies on call. These three personnel then work together and have specific duties assigned to them. The medical superintendent determines the level of mobilization required, and also whether there is a need for a mobile medical team to visit the disaster site.

The overall planning for the region is the responsibility of the police inspector; in the event of a major natural disaster, an Emergency Operation Centre would be set up in the Mackay police station. Dr Ian Chenoweth is the Chairman of the Medical Sub-committee of the Emergency Operations Group. In the event of a localised disaster, a qualified anaesthetist and a local general practitioner, experienced in emergency medical treatment, would be notified at the same time as the hospital, and would proceed to the disaster site if so requested by the emergency operation centre. Where necessary they would be accompanied by elements of the Army 9th Field Ambulance, Q.A.T.B., Police and State Emergency

Services personnel. The most senior medical officer present at the disaster site, would immediately commence setting up a medical disaster field station and make a rapid assessment of the extent of the problem. He would then notify the medical superintendent at the Base Hospital of the expected number of casualties and types of injuries. At his request, a mobile team and equipment could be sent from the hospital. In disaster plans for metropolitan areas, the composition of the mobile team and the requirements of necessary equipment is usually specified in great detail. In Mackay, one would expect however, that the main task of people at the disaster site would be to accurately assess the situation and rapidly transfer patients to the hospital, with only the most urgent life-saving first aide being given in the field.

The only situation in which a disaster team is likely to need to go from the hospital, would be where a number of people were trapped at the disaster area.

Triage:

Triage is a word which often comes up in disaster planning. Triage simply means sorting out of casualties into levels of priority, for resuscitation, treatment and transport. However, it does not mean simply sending off the most severely injured first. In disaster planning, we are at all times attempting to utilize limited resources to the greatest overall benefit. Triage means giving priority to those casualties who are most likely to benefit from urgent treatment. Triage requires a mature and experienced medical officer, who is able to make difficult decisions rapidly, it therefore should be performed by the most experienced medical person available at any time at the disaster site.

In deciding who can most benefit from available care, the factors which have to be taken into account include:

Likelihood of survival.
Likely quality of life obtainable.
Age.
General health.
Fitness, prior to injury.
Value of the person involved to the community.

It might be, for example, that an elderly person, who has over 70% of the body surface burnt, who has severe crush injuries, and therefore a very small chance of survival, even with very intensive care, must be given low priority as against a younger, previously fit person, who has a suspected ruptured spleen, which, if treated urgently, could mean total recovery, as against death if not treated.

Triage, in fact, occurs first at the disaster site, and then again at the hospital reception area, and may continue to be carried out in the emergency ward, and in the operating theatre area.

It is a common mistake for the first doctor arriving at an emergency area, to immediately commence treating the first casualty he comes across, to the exclusion of all others. The first medical officer to arrive at a major disaster, must immediately set up a medical command post, and then quickly assess the likely number of casualties and their severity. He must send this information back to the hospitals preparing to receive casualties. All casualties should then be rapidly assessed and given a triage classification. In the case of an airport disaster, differently coloured cards are tied to the casualties, denoting that they are either —

(1) requiring immediate resuscitation;
(2) requiring less urgent resuscitation;
(3) requiring transfer to hospital, but not resuscitation;
(4) requiring only first aide care, which can be given at the disaster site, or in the hospital O.P.D. An additional classification is necessary to include those who have already deceased.

Once casualties are thus identified, there is a basis for the subsequent order of transfer and treatment to hospital.

In Mackay, most initial transfers would be directly to the Base Hospital Casualty Department, unless the number of casualties were such that the Director of Medical Emergencies considered it necessary to immediately transfer some to private hospitals in the town. A special problem may arise in the event of casualties coming from an area north of the river, during the time of flood, when the Pioneer Hospital would be the only one easily reached. At present Mackay has this special problem in the time of flooding, when it is divided into two communities. The Pioneer Valley Hospital is the only one north of the river, and at present has a capacity of 32 beds and 2 operating theatres. South of the river there are 3 hospitals. 1. Mackay Base Hospital, with 190 beds and 2 operating theatres; 2. The Mater Misericordiae Hospital, 140 beds and 3 operating theatres; and, 3. Lister Hospital, with 26 beds and 1 operating theatre.

Flooding:

The Mackay Base Hospital can have staff problems created by flooding. Most of the wardsmen, domestic staff and many of the nursing sisters, live on the north side of the river, and at present cannot get to work at time of flood. Since flooding and cyclone often occur together, this could create a major problem. It would be necessary, in the event of an expected cyclone or flood, for key hospital personnel to live in the hospital during the warning phase, rather than going home at the end of their duty. In some cases, it would be best for the entire family of the involved staff member to be transferred to the hospital. Fortunately, the full-time medical officers employed at the Base Hospital, all live on the south side of the river. This includes some fifteen doctors. The medical superintendent's residence is in the hospital grounds.

Mackay Base Hospital Disaster Plan:

The hospital would normally be able to function in time of disaster, using its normal full-time medical staff, and some of the key specialists, such as the surgeons and anaesthetists. This paper does not intend to go into details, but will briefly outline some of the duties of the three key people involved in the hospital disaster management.

The Medical Superintendent:

Responsible for:—

- Overall control of medical and domestic services.
- Allocation of medical duties to staff.
- Nomination of level of mobilization.
- Nomination of medical officer to be in charge of Casualty.
- Formation of a mobile medical team, if required.
- Establishment of a central hospital control point, close to the switchboard.
- Communication with the Director General of Health and Medical Services in Brisbane, when outside assistance is required.
- Communication with the Ambulance Service, State Emergency Service, Armed Forces etc. where required. (Normally, this would be done through the Police Inspector at the Emergency Operation Centre for the town.)

Where the medical superintendent is also a surgeon, as is at present the case, he would nominate many, or all of the above responsibilities to a deputy if this became necessary.

Nursing Superintendent:

Responsible for:—

- Allocation of nursing staff to areas of duty, including those required in Casualty reception area, operating theatre, intensive care and emergency ward.
- General supervision of all nurses.
- Overall supervision of all nursing services.

The Manager:

Responsible for:—

- Alerting all paramedical staff, alerting all wardsmen.
- Arranging for any additional beds and linen.
- Arranging for any additional storeroom supplies, and urgent transfer of supplies from elsewhere.
- The transfer of supplies to private hospitals, if requested.
- Organization of switchboard and clerical staff.
- Setting up of alternative communications, if there is a failure of switchboard.
- Liaison with police, with regard to traffic control, in and out of hospital. Liaison with the media.
- Arranging transport.
- Maintaining essential services, including emergency power.
- Notifying clergymen.
- Arranging light refreshments and meals for the staff in the Casualty and Emergency reception areas.
- Clerical staff must also be provided in the Emergency reception areas for clerking of patient details on arrival, before transfer to the wards.

The notification of people is determined by the level of mobilization called for.

Level 1 Mobilization:

This requires total hospital mobilization.

- All nursing staff.
- All available surgeons.
- All available anaesthetists.
- Any other consultant staff, not allocated to other hospitals.
- All resident medical staff.
- X-ray staff.
- Laboratory staff.
- Wardsmen.
- Maintenance staff.
- Social Worker.
- Dispensary staff.
- Storeman.
- Clergymen.
- Volunteers.

The Red Cross Blood Bank would also be notified of an expected major demand for blood donors, for urgent bleeding.

The overall plan for Mackay, allocates specialists and general practitioners to the various hospitals, mainly according to their expertise and places of residence.

In the Level 1 mobilization, a Casualty reception area would be set up for both walking and stretcher casualties. The whole outpatient section would be cleared, with one end designated for ambulant casualties, who would be asked to sit and wait until they could be attended. The other end would be designated as a sorting and triage area for incoming stretcher casualties. A medical officer, designated to work in this area, together with a clerical assistant, is responsible for rapidly continuing the triage procedures already

commenced at the disaster site. Casualties requiring immediate resuscitation are rapidly transferred to the Casualty Department, while those requiring less urgent resuscitation, are held in the triage area, and treated, or directed immediately to the Emergency Ward.

The present male surgical ward is designated Emergency Ward, and medical officers designated to this area, continue assessing and treating patients sent there.

All sisters on duty on the wards, under direction of the nursing superintendent, would, immediately on notification of impending disaster, make a list of patients who could be discharged, or transferred to Nursing Homes in order to make room for incoming casualties.

Patients who have had resuscitation commenced in Casualty, and require urgent surgery, are transferred to the operating threatre area, where two surgical teams would work in the two theatres, while an additional three patients could be held in the immediate operating theatre area, on emergency trolleys, being resuscitated while awaiting surgery.

Chronic ambulatory and geriatric cases would either be evacuated to their homes, Nursing Homes or Church care, where they would be cared for with the assistance of a reinforced Home Nursing and Community Nursing Service. Arrangements have been made for the transfer of these cases by auxilary transport, organised through the Returned Soldiers League. Ambulance vehicles would be used only for transferring acute casualties.

Some patients may be able to be transferred to Private Hospitals from the Base Hospital. In particular, in planning for a pending cyclone, it may be necessary to evacuate the Maternity Unit to the Mater Hospital, so that this area could be used for accommodation of key staff and their families, during the cyclone period.

In order to minimize confusion, and expedite emergency preparations, a series of cards are being prepared for key personnel, such as the hospital triage officer, the sisters in charge of Casualty, and the reception area, sisters in charge of nominated wards, operating theatre staff etc. These cards will carry a check list of duties to be performed. They will be held in the Casualty area, and issued by the medical superintendent to the nominated personnel, early in the preparation phase.

Level 2. Emergency:

In this event, the medical superintendent will determine which personnel should be called on duty, and the remaining personnel will be notified and asked to stand by in case required.

Level 3.

In the event of an impending disaster, all personnel listed for a Level 1 disaster will be placed on emergency standby. It will be the duty of hospital staff in all areas to immediately ensure that all necessary precautions are taken in their areas of responsibility, and that stocks of necessary supplies are immediately available.

Communication:

In the event of a cyclone, or in the event of most major emergencies, an area of weakness in our plan, could be in the area of communication. Communication is necessary between hospitals, and those working at the disaster site, and various other agencies involved in the disaster plan. It is also necessary for the hospital to be able to communicate with its off-duty staff in their homes. Telephone communications could be inadequate, or totally non-existent in the event of a major cyclone. The police inspector is responsible for providing alternative communication systems. It is noted, however, that in the Mackay area, the medical community are about to set up their own independent communication

system, using ultra high frequency portable transmitter receivers, which will allow a private, high quality person-to-person communication between Mackay medical personnel and the various hospitals, within a 30-mile radius of the Mackay Telecom aerial. This system will be able to function independently of telephone systems etc. and is designed to withstand the impact of a cyclone. It should be functioning before the end of 1978, and the Mackay Base Hospital intends to have two portable radios, one of which could go to a disaster site, and the other kept in the hospital Casualty area. With this system, specialists, such as surgeons and anaesthetists will be able to talk to one and another, any where within the 30-mile radius area, and also talk directly to those working at the disaster site, and those in the hospital Casualty reception areas.

Areas of Weakness in Disaster Planning:

Recent experience with disasters seem to highlight the fact that plans often break down, mainly due to lack of communication. In crowded metropolitan areas, the biggest problem often seems to be with road transport. Roads, to and from the disaster area, become congested, and it may take a long time for important personnel to reach the disaster site, unless the plan involves the use of helicopters to transfer medical personnel to the disaster site and patients away. At the disaster site, there is often confusion, and lack of leadership. The temptation to immediately begin emergency resuscitation on the nearest available patient has to be resisted, in order to first set up a proper disaster control point at the site. Triage must then be performed as the first medical priority. Freeing of trapped victims from wreckage etc. is the responsibility of other emergency services. In general, casualties are able to be removed from the disaster site only in numbers of one or two at a time, and large numbers of ambulances all cluttering up the disaster site is generally not necessary.

It is necessary to have well planned disaster boxes, containing medical emergency equipment available for use at the disaster site, and if possible, equipment should not be removed from ambulances, which is going to be required for emergency care of patients while in transit.

Cyclone Disaster Planning:

There is no disaster plan for cyclones in existence at this stage for the Mackay Base Hospital. Some rather special areas have to be catered for. The major problem is to be able to plan for the provision of normal hospital functioning and care of both inpatients and outpatients in a situation where the hospital itself may be damaged, and there may be a general breakdown in normal community supply services, including power, communications, provision of food etc. There would also be an increased demand on the Casualty and Outpatients' Department over a long period of perhaps a week or two, following the initial 24 hours after the cyclone, when all the major injuries would have been processed. There is a need for the hospital to provide shelter for some staff and their families, and possibly for other people.

At present, Mackay Base Hospital is undergoing major building extensions, which will largely replace most of the present inpatient and outpatient facilities. The new buildings, which will be completed by early 1980, should be that they could provide extensive shelter in a post-cyclone period, although they do not yet have any facilities such as power, water, lighting etc. Cyclone planning cannot be too specific, because the nature and extent of damage to the hospital buildings would largely determine the details. Many of the procedures outlined as for a Level 1 disaster, would apply, and would be modified to suit existing circumstances.

MEDICAL PREPAREDNESS : THE DARWIN EXAMPLE

Dennis L. Fitzsimmons

I have been asked to speak on the Darwin example, and how it worked. Obviously Darwin did have a plan, so this is my personal appreciation of how successful that plan was.

At the outset I will say that I thought it was successful, it worked efficiently. Why did it do so? In the early 1970's the medical emergency plan was upgraded in Darwin due to the enterprise of a then Superintendent of the Hospital. In the early 1970's jumbo jets just arrived in Australia and there were large numbers of R and R U.S. servicemen coming through on their way south, through Darwin. The possibility of a catastrophe at the airport obviously stimulated the Superintendent to upgrade the existing medical emergency plan, and he did this with enthusiasm. It was not an elaborate plan but it was a plan which was practised every year and all the people involved played a role in dry runs. Now the plan also included preparation for a cyclone, and as David Bleakley has pointed out, it had to be in some detail for a major hospital to ensure that its responsibility to inpatients is guaranteed, and there are a whole host of things that have to be done in any hospital to batten down for a cyclone. We had a dry run, fortunately, some 2 weeks before cyclone Tracy, so the concept of a cyclone, and what would be involved for the medical personnel was well in everyone's minds at the time of Tracy. The hospital itself sustained minimal structural damage, but there was much destruction of the services that could be provided by the hospital and it took varying periods of time before many of these services were returned to normal. There was an auxiliary power plant, but the air-conditioning unit to the hospital was damaged so electricity didn't do anything for the airconditioning to the tropical environment where we had major injuries. The theatre floor was sweltering, and contamination of wounds was obviously a major problem: it took some days before the air-conditioning could function, yet there was plenty of power, there was electricity and we had lights. The plan as David Bleakley outlined has an executive who delegates and organises. I was an Indian and not a Chief, so I played no role in the actual organization of casualties who arrived at the Hospital. The over-riding fact was that communications were essential, telephones were out and other means of communcations had to replace the normal means. Remembering that Darwin Hospital was the only hospital, catering for 50,000 people, it was my impression that casualties presenting at the Darwin Hospital were handled efficiently and were directed to the appropriate areas. Obviously there was extreme congestion.

The other interesting fact was that, despite wide-spread structural damage to the town, the number of seriously injured was minimal. On the first day there were only 16 major cases that went through the two operating threatres. Unfortunately, there was a need for the third theatre, but it hadn't been built at the time of the cyclone, so there was an unnecessary delay in some of the patients receiving treatment in theatre, but by late on day one of the cyclone, all the major injuries had been processed, so that when the relieving medical teams arrived from down South, their duties involved minimal major surgery in the next few days.

What about the organization of services outside the Hospital, where the casualties existed? How did this function? Very fortunately, despite severe damage to all

Dr Dennis L. Fitzsimmons: MBBS, BSc, FFARACS Consultant Anaesthetist, Mackay Base Hospital. Director of Anaesthetics, Darwin Hospital at the time of Cyclone Tracy.

communications systems, St Johns Ambulance took the initiative, and came up with an effective plan. Within minutes of the major winds subsiding, the St Johns Ambulance had, in a co-ordinated manner, despatched its ambulances out collecting and transporting casualties from the northern suburbs and suburbs close to the Hospital, right to Casualty. By using their radio network, stationing an ambulance at the Hospital, an ambulance on one of the major prominent hills, this provided a very adequate means of communication, co-ordinating and alerting people at the Hospital to the patients being sent in. The massive wide-spread destruction meant that the housing problem was acute with people obviously congregating in the remaining buildings: these were predominantly the high schools which were strong Commonwealth-built structures.

It was in these areas that timely medical care was administered by the General Practitioners: at all times there was an adequate number of practitioners, providing medical care, in the somewhat congested, collecting areas. The Ambulances Services coupled with the services of the Health Department, guaranteed that supplies were being continually sent to areas where they were needed and casualities were being transported back to the Darwin Hospital as necessary.

I would like to emphasise that within 24 hours, the major responsibilities of the Hospital had been considerably diminished, the effective evacuation of the seriously ill, took place within the first 24 hours, and within 48 hours all the seriously ill, who were inpatients at the time of the cyclone were evacuated South. So the holding capacity of the hospital was considerably reduced and its responsibilities were minimised by the fact that there was wide-spread evacuation of the population. The medical problems diminished as the population diminished, but in the critical 24 hours a plan which had been practised on dry runs over the preceding two or three years obviously bore fruit. The initiative shown by the people in the Ambulances services guaranteed a very good form of communication which allowed a very serious situation to function in a controlled manner.

HOSPITAL PREPAREDNESS : CAIRNS, N.Q.

Lawrence John Perrett

In approaching the subject of Hospital Preparedness in the event of natural disaster, which in this paper will imply cyclone with or without storm surge, I must qualify the more specific intrahospital measures adopted, by outlining two aspects of hospitalisation in a broader context.

The first matter regards the relationship of the hospital to the State Counter Disaster Organisation (S.C.D.O.). As applies in other centres, under the mantle of the S.C.D.O., there is the essential portfolio of 'hospitalisation', and the respective Medical Superintendents, ex officio, assume the position of portfolio holders. The inherent responsibilities of those involved in hospitalisation are for the continued care of patients already hospitalised, the management of those unfortunate enough to suffer serious injury during the disaster period, and for the management of those who suffer serious illness unrelated to the disaster but occurring during its period of influence. Unfortunately disease processes and weather reports are singularly unrelated — and, in any 24 hour period, in an area with a population such as Cairns has, it can be expected that there would occur a significant number of medical emergencies of a 'natural' kind.

The portfolio of hospitalisation includes all acute hospitalisation and therefore the responsibilities also extend to Calvary Hospital, a private hospital without administrative connexions with the Base Hospital, but which is included in the terms of hospitalisation once a state of emergency has been declared.

The second matter which is of special local importance and which appears unique in a city of this size, is that both acute hospitals, Cairns Base and Calvary, are vulnerable to storm surge due to their proximity to the waterfront. This could therefore provide additional problems in the event of storm surge, not only because of internal disruption, but also because accessibility to, and possibly even communication with both hospitals may not be possible for an extended period. As the hospitals cannot be evacuated in toto, they would be required to function in isolation for a time. During such an episode, it would be necessary for alternative medical care to be available in other areas within the city and surrounding suburbs, and on this problem, the following speaker, Dr Peter White will provide information.

I shall shortly outline the measures adopted within the hospital, presuming that the usual regular meteorological warnings are available, as time is necessary for the implementation of these plans. In the unlikely event of an unexpected cyclone commencing close to, and bearing down on Cairns, a somewhat abbreviated plan is necessary — I shall not elaborate on this, other than to mention that the safety of patients and personnel remains the prime concern.

Dr Lawrence John Perrett: MB BS (*Qld*) FRACS
Medical Superintendent Cairns Base Hospital. Field Liaison for Hospitals, State Counter Disaster Organization.

I can make brief mention only of long term preparedness. In the main, little can be done in this regard, within the hospital. Education of staff though essential, is basically ineffectual, primarily because of the vast turnover of staff even within one cyclone season. Rather, reliance is placed on the involvement of key senior personnel. A prepared circular, however, is distributed to all senior staff and departmental heads, outlining the basic requirements.

During the danger months, November to April, a stock of non-perishable foods, including infant formulae sufficient for a minimum 24 hour period, is stored in a safe area. Endeavour is also made to ensure adequate supplies of essential drugs, dressings, intravenous fluids, etc. The supply of such items, however, is sometimes variable for reasons beyond our control, and it is conceivable that this could result in relatively depleted stores —but usually reasonable stocks of essential supplies can be maintained, at least to cover a two to three day period.

As a medico-legal precaution, specially prepared marked record cards are held for use during a state of emergency, for all patients who suffer injury as a direct result of a disaster. This is of particular importance for those injured whilst on official duties.

In the shorter term, the majority of hospital preparations must be undertaken only after the threat of cyclone is real. As alluded to earlier, for this, reliance is placed on information relayed from the headquarters of the S.C.D.O. which will normally be the police station. The liaison is such that the information is supplied directly to the Medical Superintendent who is responsible for initiating all intra-hospital activity.

Once it is established that a cyclone threatens the Cairns area, but is some 16-24 hours distant in estimated time, the Medical Superintendent advises the Nursing Superintendent and the Manager each of whom undertakes preliminary checks in areas of specific responsibilities.

At this time the Medical Superintendent advises medical staff to arrange for the discharge of those patients who can safely be released to the care of family or relatives, and to ensure that ample medications are provided, and that the patients' subsequent follow-up has been arranged. At this time also, routine admissions to hospital are cancelled and advice given to these patients under what circumstances they are next to contact the hospital regarding their admission.

These measures are adopted as there is need to decrease the inpatient numbers, because it is not considered safe to house patients in the older buildings during a cyclone. By decreasing the total numbers, those remaining can be accommodated in safe areas, at the same time retaining a satisfactory number of vacant beds for a possible influx of injured patients. There is usually a significant number of inpatients for whom hospitalisation is not essential for their well being, and others who insist on their discharge during such a period.

At approximately eight hours prior to the estimated arrival of a cyclone, further actions are undertaken concurrently, and these are detailed as specific responsibilities of the Medical Superintendent, Nursing Superintendent and Hospital Manager. These actions will be listed with brief explanation where necessary.

The duties of the Medical Superintendent are the following:-

(a) To determine when detailed preparations must commence.

(b) To inform the Matron of Calvary Hospital of the probability of a state of emergency being declared, and to advise of the actions being undertaken at the Base Hospital.

(c) To inform the Director of the Commonwealth Health Laboratory, who is responsible for that property. Arrangements are then made for certain laboratory facilities e.g. blood cross matching, to be transferred to the Maternity and Surgical Block. When

required thereafter, the Director will arrange for technical staff to attend for the duration of the cyclone.

(d) To advise the Chief Pharmacist at the hospital, to arrange for the distribution of essential drugs (for which there is a prepared list), to designated areas.

(e) To arrange for a Medical Officer to attend the headquarters of the S.C.D.O., when requested, to act as liaison officer between that organisation and the hospital.

(f) To advise full time medical staff who are not on duty, to remain on immediate call. Should their services be required, they are advised that their families may obtain refuge in the Nurses' Home where rooms would be allocated to them. The families are advised to provide their own food and water should they elect to come to the Nurses' Home.

(g) To inform the Chief Radiographer who will arrange for the attendance of staff within the hospital for the duration of the disaster period.

(h) To contact the Officer in Charge of the Blood Bank to ensure that supplies are satisfactory and to prepare for a possible demand for blood at a later time.

The Nursing Superintendent has the responsibilities of:-

(a) Organising available staff to cover all areas where patients are, or will be, located.

(b) Facilitating the discharge of patients.

(c) Organising the orderly transfer of patients from the older buildings to the Maternity and Surgical Block and to the Thoracic Building.

and,

(d) Organising the relocation of the Casualty Department in the Maternity and Surgical Block.

The Manager's responsibilities are:-

(a) To organise staff to attend the Boiler which, incidently, in the event of possible storm surge would be required to cease functioning.

(b) To ensure that emergency power and lighting is available, including the continued functioning of Blood Bank refrigeration.

(c) To ensure storage of water and transfer of additional nonperishable foods from current stocks.

(d) To organise relocation of records, equipment and stores. This last matter varies as to whether or not a storm surge is also expected. If so, there are specific requirements and priorities in the relocation of ground floor equipment, records, drugs, etc. to predetermined areas above expected surge height.

(e) To organise domestic staff assistance throughout the hospital.

and,

(f) To ensure that buildings and loose objects are made fast.

Once the relocation of Casualty has been effected, the Ambulance brigade is informed to bring patients to the rear entrance of the Maternity and Surgical Block.

Further mention must be made regarding Calvary Hospital. In consultation with private practitioners it has been decided that medical services to that hospital be provided by local private specialists and general practitioners as these medical officers are familiar with the facilities at Calvary, whereas, if Medical Officers were sent from the Cairns Base Hospital they would be totally unfamiliar. Further, such action may significantly deplete medical services at the larger hospital where it would be expected the majority of medical manpower would be required.

Once the above measures have been completed, our aims of ensuring the care and safety of inpatients, of providing safety of staff, of being able to function in isolation, and of being prepared for the post-emergency period, have, we hope, been achieved. It must be appreciated that the success of these preparations depends solely on the responsiveness of staff to their duties during the disaster situation, and there is no possible way of assessing this until the situation arises.

LOGISTICS OF HEALTH CARE IN DISASTERS : CAIRNS, N.Q.

George Ellis

Dr L. Perrett, Superintendent of the Cairns Base Hospital has already spoken of the Hospital's preparedness in the event of disaster, and as the Hospital is of brick and masonry design and multi-storied, it is improbable that evacuation because of a surge would be likely.

This Paper, then, will be related to the necessity of evacuation of the aged and infirm within the community in the event of a cyclonic surge.

To set up this task, the identification of the clients requiring evacuation must be made, a register of such must be obtained, and a classification of the type of aid is necessary.

Discussing these 3 requirements we will consider:

1. Identification:

Those aged and infirm cases housed in known geriatric institutions, such as Bethlehem Home, Good Samaritan Hospital, Farnorha and Masonic Home for the aged, are easily identified. Being a static group any evacuation process can be arranged with such aiding group as staff of these institutions.

The public sector of aged and infirm are unfortunately not as easily identified, and due to the apathy of human beings, these folk have not made any great attempt to register their needs for evacuation, in spite of numerous media requests by the S.E.S. and Welfare Services for them to do so.

The Community Health Service has been of the greater aid in this task, in that a record of likely candidates for evacuation can be obtained from their files.

Other organisations such as Blue Nursing Service, Red Cross, Pensioners League, Senior Citizens and Laurel Club can also be approached for such clients' names.

2. Registration:

Following this identification, a card register is then set up. As previously mentioned, those in the static area (i.e. Homes), need not individually be taken by name, but rather by numbers and type of infirmity.

In the Public Section, the register cards carry the names and addresses of such people, and these are then card-indexed and further allocated to districts that can be served by a major roadway. (Cairns City has been in this way divided into 6 such districts).

Dr George Ellis MB BS(*Qld*) FRACGP
Medical Officer in Charge, Community Health Centre, Cairns: Royal Australian Army Medical Corps (5 years). Leader, Welfare Team, State Emergency Service, Cairns.

3. Classification:

Types of infirmity should be known, and the potential evacuees are subdivided into 4 classes,

(a) those capable of walking and self help.
(b) those incapable of walking without assistance.
(c) those requiring stretcher carrying i.e. bed-fast or chair-fast.
and (d) wheelchair clients.

This classification allows a recognition of the type of transport that will be required for the purpose.

For example, buses carrying 60 to 80 walking cases, can be used and by the utilisation of rescue personnel travelling with the buses, the loading of those requiring help in walking cases can be expedited.

Ambulance vehicles can be used for stretcher cases and covered pantechnicons could be considered for the movement of wheel chair users.

Having registered and classified the public sector, each client is required to fill in a form carrying suggestions and requirements to allow ease of care, and asked to return this to the welfare team/area performing the evacuation.

This form requests:

1. That a card carrying their Name, Address, and Next of Kin to be pinned to their clothing.
2. Any illness being treated, and medication required are noted on this card.
3. To carry an overnight bag containing one change of clothes, torch, medication, or essential prostheses (Catheters, Duval bag, colostomy bag, etc.).
4. To have own pillow and blanket ready for transport with them.
5. Pension Card, Private insurances and bank book be carried in the overnight bag.
6. Prior arrangements for pets to be made, as no care can be given in this field.

4. Accommodation:

Search is made for relatively safe sites for such accommodation i.e. preferably brick or solid buildings above the surge areas that have been estimated. Staff manning such areas, will be medical officer, area manager, aiding persons, unloading groups and transport and communications officers, and registrar.

Static areas i.e. Infirmaries and Homes are evacuated to one site, whilst the public sector is subdivided so that all bed-fast, chair-fast and wheelchair cases are directed to a second area, and the walking aged to a third area. Other welfare teams will be responsible for feeding, bedding and clothing.

5. Transport:

Estimated transport requirements should be made to the Welfare director so that the Transport Section may have nominated numbers of buses, ambulances and pantechnicons standing by for immediate movement on the reception of the Red Alert. These vehicles should be directed to their previously known areas of use, to report to a transport officer at each Centre, who will hopefully co-ordinate loading and transfer of clients.

Each transport driver will have been furnished with a card bearing the number of cases to be evacuated and their area of service or district clearly delineated.

Together with these transports, loading teams will be sent to facilitate transfer of evacuees. These personnel will be on 'stand by' prior to the Red Alert being received and will be allocated to the transport vehicle using them.

With the transport of evacuees, there will also be allotted a pantechnicon to each recovery vehicle. Loading personnel will load bedding (i.e. mattresses, pillows and blankets, together with unspoilable foods) for immediate usage by those members of welfare sections at the "feeding" Centres. This is directed at Aged Homes rather than the public sector.

On reaching their designated accommodation area, off-loaded evacuees will be registered by a registration officer on site and then handed to the care of the designated centre manager for disposition within the new centre. The transport officer, in association with the driver of the vehicle will assess the possibility of further trips and act accordingly.

It can possibly be noted that a once only evacuation is to be attempted, as the time factor between notification of surge onset and evacuation, will probably disallow a second bite of the cherry.

6. Regarding Accommodation:

These areas of substantial construction and beyond surge heights are chosen carefully to have if possible calor gas cooking facilities present. Where stretcher cases and chair-fast evacuees are to be accommodated, beds available sufficient for this purpose, should preferably be present. This allows a lesser need for calls on the resources group, although undoubtedly the larger centres from the aged homes will require resources support in food, fuel and lighting and possibly bedding.

7. Communication:

Under the conditions expected to exist, the utilisation of telephone communiation can be short lived. Because of this fact it is consdiered desirable that all vehicles evacuating clients should be in V.H.F. or S.S.B. (via Home station) communication with the bases in which they are delivering evacuees. Should a transport vehicle break down when loaded, such communication is felt to be necessary. A further point is that a "breakdown" or tow vehicle should be immediately available to clear such an obstacle. Without communication between the breakdown vehicle and the centre by radio communication, the time factor in passing a message to the resource vehicle could negate such a rescue.

8. Medical Requirements:

For optimum results it is expected to have a Medical Officer, and aiding persons available at each accommodation centre. Medical requirements can be obtained from Cairns Base Hospital or from Resource Group via the Pharmacists. Such requirements will be limited to immediate crisis use. For example Insulin, Digoxin, Aminophyllin, Steroids, Morphia, Pethedine and oxygen cylinder kits will be available. In the post surge period, wider ranges of medications could be sought if necessary.

Feeding, laundry and clothing will be handled by other members of Welfare detailed to the Centres designated.

Resources, should be used as replenishers of fuel (gas, petrol, diesel) materials as required, together with the obtaining subsidary lighting required.

9. Triage:

It is believed that Triage will operate almost automatically in the exercises.

1. Any householders although nominating evacuation will not be argued with into leaving against their will, at the time of the evacuation. Whilst legally such action is permissible, it is felt that the time factor would disallow this to be actively used.

2. Immediate evacuation will be in the order of (a) walking cases and, (b) stretcher or wheel chair cases.

3. If flooding, washouts or debris disallow evacuation it is hoped that no dramatic efforts of rescue will be made until all other available evacuees are accommodated.

In conclusion, I might add that whilst it is fervently hoped that such an exercise can be fruitful, my increasing years make me very sure of the fact that Murphy's Law is ever present, and as Robbie Burns once is supposed to have said, "The best laid plans of mice and men gang aft agley."

MEDICAL PREPAREDNESS AT THE COMMUNITY LEVEL : CAIRNS (N.Q.) AREA

Peter White

In 1975 under the guidance of Dr Ken Pettit, a group of interested doctors formed a voluntary committee to investigate ways in which the services of doctors, not directly committed to hospital service, in other words, the private medical practitioners, could be most effectively utilized in the event of a major disaster. One presumes a catastrophe of such magnitude to cause extensive material damage and inevitably a vast number of casualties, both major and minor. The aim of the voluntary committee is to organise the medical services, more or less to provide a medical first aid service in the community areas, and thus spare the hospital from having to deal with these problems.

The committee at present consists of five members, three of whom are general practitioners, one of whom was present in the Darwin cyclone in 1974. At the beginning of each cyclone season, around November each year, this committee comes together to organize for the coming season, as it were. An up to date list of all doctors in private practice, their addresses and phone numbers is compiled. To be effective, this has to be revised each year, because of the frequent changes of addresses and movement of doctors in and out of the area. Secondly, a letter is sent to all private medical practitioners reminding them of the organization of medical services in the event of a cyclone. It must be emphasized at this point that the committee has no administrative power, and our action is taken in the anticipation that our colleagues will voluntarily co-operate with us in these matters. To give you some idea of what material is sent out I will quote from the text of the last letter sent on the 30 November, 1977.

"Dear Doctor,

The 1977-78 cyclone season has started. We are again liaising with the State Counter Disaster Organization, and State Emergency Service, for the best use of medical resources in the event of a cyclone. Our aim is to treat as much as possible at a local level, to prevent disastrous overloading of the Base Hospital. We have also undertaken to staff the Calvary Hospital, although it is understood Dr Perrett will be officially in charge of all hospital services. Regional centres staffed by local doctors and welfare personnel from S.E.S. will be set up at Cannon Park Race Course, Showgrounds, Trinity Bay High School, Cairns Highschool, Edge Hill School, and Freshwater School. We feel that once a 24 hour warning has been issued, every doctor should be prepared to take home a good supply of basic suturing, dressing and antiseptic materials. Obviously during a cyclone you shelter, and after it, attend primarily to the needs of your family. After that, unless you have specific duties elsewhere, we feel you should try and get to whichever of the above centres you have been allocated. Peter White will be at the SCDO Headquarters to liaise via commercial radio and the ambulance network, to organize supplies and re-locate doctors where needed. We would ask you to —

1. Please keep a transistor tuned to a local station.
2. Please leave behind notices of your whereabouts.
3. Please increase your surgery stock of dressings and suture materials now."

Dr Peter White MB BS (*Syd*) FRACP
Consultant Physician, Cairns Base Hospital, Member of Committee of Medical Practitioners affiliated with the State Counter Disaster Organization, and State Emergency Service.

Considering how the plan might operate in the event of an emergency, on the issue of a cyclone watch, members of the committee would ensure, by phoning around, that all the other members are conversant with the situation at the time. On the issue of a cyclone warning, the SCDO/SES will notify the medical co-ordinating officer, either Dr Ken Pettit or his delegate, and request medical representation at the emergency operation centre. Each member of the committee will then, from the compiled list of doctors, phone in alphabetical order, 10-15 people on that list and recommend,

1. that basic materials e.g. needles, sutures, antiseptics, dressings, antibiotics and antitetanus serum be taken home.
2. that the doctors concerned should proceed to such and such work location area after the cyclone passes, and
3. that the doctor should stay tuned to the local radio station on his transistor.

After the cyclone has passed, the liaison officer proceeds to SCDO HQ and assumes control of organization of medical services, utilizing such means of communication as are available, probably mostly through the ambulance radio network. The individual doctors around the town will attend to the needs of their family, and perhaps their neighbours, and then proceed with their equipment to the work location area predetermined before the cyclone. They may be asked subsequently to move to another area at the request of the liaison officer. When established at a work area, the doctor will obviously set obout dealing with the casualties. Some sort of local organization would be desirable at the work locations, and the doctor may be able to utilize his surgery sister in this, or may have to seek assistance from a member of the public. There would be a need to establish patients in some sort of waiting order perhaps with priorities, and a need to keep some rudimentary records.

Meanwhile the liaison officer will be seeking, on the basis of in-coming information, to locate doctors most effectively in key work areas, and to try and secure first aid supplies from local pharmacies and the hospitals. These materials could be taken to work areas by SES transport.

Finally a question which arises is how long such a scheme operates, and one view is that this is an emergency first aid operation aimed to get in, and deal with the minor casualities as soon as possible after the disaster. Once the bulk of the casualties has been cleared, the operation should wind down and medical care should revert to doctor's surgeries and hospitals. It is not our role to become involved in public health programmes, e.g. large scale immunization, which is the responsibility of the Government Medical Officer, although it is recognized that he may well co-opt private doctors to implement any such scheme.

The aim therefore is to create some sort of order out of possible medical chaos. There will clearly be many problems and difficulties. For example in this city almost the entire medical community live in two adjacent suburbs, and if they were to proceed to their nearest working area following a disaster, the Edge Hill State School would probably have more doctors than patients. The re-location of doctors to areas remote from their home is obviously an organizational matter, but one can see problems servicing an areas such as the Freshwater School on the other side of the Whitfield Range, if communications and roads were seriously affected during the disaster. The efficiency of the whole operation will be largely dependent upon the feedback from the peripheral areas, in other words effective communications, so that the medical manpower may be located where it is most needed.

AUSTRALIAN EXPERIENCE IN WELFARE PLANNING IN NATURAL DISASTER

Ann Quinnell

5th March, 1819

"The Governors official communication from the interior within the last few days have excited in his Excellency's mind, the most sincere concern and regret for the recent calamities in which the unfortunate settlers on the banks of the Nepean and Hawkesbury have been once more involved, by the late dreadful inundations of these rivers.

Whilst it does not fall within the reach of human foresight or prosecution to be able to guard effectually against the baneful recurrence of such awful visitations, or to avoid being more or less involved therein, yet when the too fatal experience of years has shown the sufferers the inevitable consequences of their wilful and wayward habit of placing their residences and stock yards within the reach of the floods (as if putting at defiance that impetuous element which it is not for man to contend with) and whilst it must be still had in rememberance, that many of the deplorable losses would have been in great measure arrested had the settlers paid due consideration to their own interests, and to the frequent admonitions to remain within the flood marks of the townships assigned for them on the high lands. It must be confessed that the compassion excited by their misfortunes, is mingled with sentiments of astonishment and surprise that any people could be found so totally insensible to their true interests as the settlers have in this instance proved themselves. His Excellency however, still cherishes the hope that the calamities which have befallen the settlers will produce at last the good effect of stimulating them to the highly expedient and indispensable measure of proceeding to establish their future residences in the townships allotted for the preservation of themselves, their families and their property and that they will one and all adopt the firm resolution of forthwith erecting their habitations on the high lands cheered with the animating hope and fair prospect of retrieving at no very distant day their late losses, and securing themselves from their future recurrence.

Those who, notwithstanding shall perversely neglect the present admonition and exhortation to their own benefit, must be considered wilfully and obstinately blind to their true interests and undeserving any future indulgences: whilst on the contrary those who shall meet this severe dispensation of providence with manly fortitude and unbroken spirit may rest assured that their exertions and industry will not only merit, but obtain the favourable consideration and protection of this Government.

These orders are to be read during the time of Divine Service at each of the churches and chapels throughout the colony on the three ensuing Sundays."

Signed: *Lachlan Macquarie.*

Miss Ann Quinnell: B. Social Studies, *U. of Q.* Senior Child Care Officer, Department of Children's Services, Brisbane. Executive Officer, Queensland Disaster Welfare Committee. Consultant to Toowoomba Storm Disaster Recovery Unit. Co-ordinator of Flood Recovery Unit at Warwick. Technical Consultant to Consulting Engineers on Brisbane Suburban Creek Flood Study. Publication include: Executive Officers Report to Queensland Disaster Welfare Committee, November, 1974. Social Aspect of Flood Warnings — Proceedings of Symposium, January 1974 Floods Moreton Region: The Australian Institute of Engineers (Q. Division) August, 1974. Social Components of Flood Plain Management — Proceedings of Symposium, Australian Institute of Engineers, (Q. Division), 1976. Maximizing Benefits to Urban Residents of a Total Flood Warning System for the Brisbane Valley (co-author): Proceedings of National Hydrology Symposium, Australian Institute of Engineers, 1976.

A useful definition of disaster in looking at Welfare Planning is as follows:

"Disaster. . .means the impinging on a structured community, or one of its sections, of an external force capable of destroying human life or its resources for survival, on a scale wide enough to excite public alarm, to disrupt normal patterns of behaviour, and to impair or overload any of the central services necessary for the conduct of normal affairs or to the prevention of alleviation of suffering and loss. Usually, the term disaster refers to an episode with tragic consequences to a substantial portion of the population."

R.L. Wettenhall

Powell, *An Introduction to the Natural History of Disaster.*

This tends to be a sociological definition of disaster and to omit the geo-physical and meteorological basis of disaster. This definition will underpin all references to welfare planning in natural disaster.

Disaster Sequences

For planning purposes, it is necessary to provide sequencing to the disaster event. Whilst there is overlap between the following sequences, they provide some discernible dimensions to the disaster event. The sequences are as follows:

Pre-impact
Warning
Impact
Immediate post-impact
and Recovery

What I mean in each of those in the planning context is a range of activities on the planning base designed to mitigate or prevent disaster or disastrous effects, and also where in each of those Welfare has a role to play.

In the Pre-impact phase for example, the range of activities must be related to mitigation and prevention of disasters in preparation for the impact of disaster. Since the Welfare field is mostly going to deal with the disaster effects, they should therefore be making a contribution, particularly to technological fields, in mitigation and prevention measures, e.g., in flood plain management, in perception of hazards, why is it that people live in high risk areas? Why don't people make choices about individual preparation for a disaster? All of those kinds of questions can have a contribution made to their answers from the welfare field.

In the warning sequence, I am talking about environmental changes which lead to the preparation of official news, which also leads individuals to recognise the likelihood of a threat being realised. Sometimes it is easy to forget that in warning phase, people respond not only on the basis of official warnings but also on their own perception of the environmental changes that are occurring. They are most likely to take action after checking out response in their social networks. What the social network is doing about the situation e.g., how their friends think they are going to respond? — is critical. Some of that social network checking will involve checking back with the official warning source. Warning can be split second, it can be hours, days, months. One of the most difficult events to warn about is the disaster event which enters into the rare event category e.g. Brisbane floods of 1974 can be classified in the rare event category, the last major flood of similar proportion occurred in 1893, and the public memory of that flood having been lost, there was no experience on which people could base a response and the warning response rate was extremely low. In the rare event situation, it may be as difficult for official organisations torespond as it is for private individuals.

In the impact sequence, I am obviously talking about the actual realisation of the threat, whether it is earthquake, flood, drought, and whether the impact occurs over a long time or a short time.

In the immediate post-impact phase, occurs convergence phenomenon, which you may have also heard referred to as the cornucopia effect, begins where the message starts to come in, and the "doers" are on their way to be closely followed by the goods.

The recovery phase, includes both, initial recovery of individual property and the beginning of recovery and restoration of official buildings etc., and the start of the long-term reconstitution of family and the restoration of community and family property, so the planning I am talking about refers to these sequences, in relation to natural disaster, but to recovery in the main.

Disaster and the Australian Experience

First efforts in Australian Welfare planning, obviously were undertaken by individuals, who recognised the threat and took adequate and effective preparation to deal with that threat. Today it ranges from levi-bank preparation on some inland rivers to flood-proofing of houses etc. We must not forget that the individual is the one who begins the initial operation. One of the things we have to plan for is to stimulate the individual to undertake the initial preparation.

The first official co-ordinated planning occurred within civil defence, and I am sure that later speakers will talk about it, and the current State Emergency Service preparation. Early Civil Defence related to emergency mass planning, mostly in relation to the impact of nuclear disaster, and has obviously grown since that time. Other early efforts of course, related to voluntary organisations, in particular Australian representatives in international organisations which deal with, on both a global scale and on an intra-national scale, disasters of various kinds. In this Red Cross has a very long history.

Recent organised efforts for planned welfare services to disaster victims read like an agonising roll call. And now I will just go through those disasters where some organised welfare services were involved.

Hobart — Fire 1967
Blue Mountains — Fire 1968
Meckering — Earthquake 1968
Townsville — Althea 1971
Queensland — Floods 1974
Darwin — Tracy 1974
Toowoomba — Hailstorm 1976
Queensland — Inland river floods 1976
Ingham — Flood 1977

And I will speak more towards the end, of the most tremendous in terms of human life and that is the Granville Rail disaster. I have excluded it from this list because it is a man made not a natural disaster.

I would like to spend a bit of time, talking about what happened in relation to welfare services at each of those situations, in particular the state of planning that existed prior to the impact.

Hobart — Fire 1967

At the Hobart fires in 1967, I need hardly tell you about the environmetnal situation in relation to those fires, and I am sure you are also aware of the large scale damage which resulted, and the number of deaths and injuries and homes destroyed. There was no welfare preparation for that disaster. Planning occurred on an ad hoc base during impact and

recovery occurred around a number of leaders who emerged in the welfare community during the impact phase. To plan a response, they had to overcome the lack of existing structural relationships between the organisations that were concerned, e.g. Department of Social Welfare, Health Commission, Voluntary organisations. They had to set up a structural mechanism on the spot. Because there was no real idea at that stage of where the people were in relation to that fire, they had to set about finding people and they then had to sit down and talk about the likely effects of that fire on those people. They made one important discovery in doing that. They discovered that in terms of the usual tasks of welfare professions, all deal on the day to day basis of the individual and family crises, they could transfer that knowledge to dealing with disasters, wherever there were essentially individuals and families in crises.

They began devising some co-ordination of incoming resources to those victims and setting up centres where people could come for aid, information, and I will talk about information later, for emergency clothing, emergency housing and emergency cash. The service that went on, eventually formed out of that, was essentially an individually orientated service and had almost no community work contained in it. It was not concerned about the community of the victims generally prior to that fire, but more about the individuals in their long term response. Massive aid also poured in after that fire. This seems to be a phenomena relating to parts of a nation that are totally dependent on a Federal Government for money, which Tasmania is because of its distance and size. Massive aid came in and was mostly distributed by citizen type committees with State Government representative on them. Eventually there was formed a Tasmanian Fire Victims Welfare Organisation. This finished its task some eight (8) months after the Fire and in finishing its task made recommendations about still unmet needs of some fire victims, and the necessity of planning future events.

Blue Mountains — Fire 1968

Blue Mountains Fires in 1968 were again a severe event. There was no planned response. The response did occur primarily around an emergent community leader, who was a member of a local welfare organisation, who through, what could be called charismatic qualities, gathered around him organisations who were prepared to pool resources. It mainly related to the provision of cash, food vouchers and did not necessarily concern itself with the long-term recovery needs of those disaster victims.

Meckering — Earthquake 1968

This earthquake, in welfare terms, was unplanned for disaster. Certainly the risk was known about and in terms of the earthquake situation in Australia there had been no planned central point to provide for towns in the earthquake belt which may have been hit by earthquake. The response was very quick, but again related to emergency power, emergency clothes and emergency food and some counselling provision by welfare staff.

Townsville — Althea 1971

I am not going to tell you about it, as you know already.

Darwin — Tracy 1974

In terms of the welfare component, the recovery of Darwin was unplanned for. It was planned for in a sense that throughout Australia, S.E.S. or Natural Disasters Organisation are ready to meet an emergency. What they are not prepared for is the reconstitution and restoration of family and community life in a welfare sense. The Darwin evacuation wasn't a planned-for eventuality. To meet the need of evacuees required ad hoc planning as evacuees were in transit. That is not the most efficient way to meet the needs of evacuees. Out of the aftermath of the attempts to deal with Tracy, have come moves on the part of

every State Welfare Department in Australia to plan adequately for disaster, because the resources of those State Welfare Departments were overstretched in trying to meet the needs of the Darwin evacuees. There was no co-operative welfare structure for State Welfare Departments to plan conjointly with voluntary organisations and the difficulties of providing a rational response were evident.

Queensland — Floods 1974

Between December 1973 and March 1974, 80% of rivers in Queensland were in minor, moderate and major flood. Obviously major populations were affected and there was little effective mass emergency planning. In relation to the Brisbane-Ipswich situation, welfare organisations responded some 12 hours before the floods peaked. Over a period of 9 months after, they, in conjunction with Commonwealth and State Welfare Resources, were establishing direct services to disaster victims as well as establishing the structural means by which resources could be deployed effectively to major affected populations. The service saw 11,000 people, established flood relief centres for information provision, detailed outstanding needs and used professionals and volunteers in counselling. The service is documented in "The Executive Officers Report to the Queensland Disaster Welfare Committee".

Toowoomba — Hail Storm 1976

In January, 1976 a hailstorm hit the city of Toowoomba: it was an unplanned-for eventuality, but there was the S.E.S. planning for mass emergencies and there was an efficient response for rescue and immediate covering houses to save further damage. The parts of town that were hit included two quite different in population. One was what is old part of town, which has a very high old aged population, with reasonable deteriorating housing, and it also had in that section, highly transient families, young families, highly committed financially. The initial community response for that hail storm, was that since Knob Hill is the only place to be hit, they had enough money of their own to look after themselves. It took some three weeks before the very urgent needs of the aged and very young transient families to be recognised and something done about them. The hail storm in Toowoomba illustrates a number of problems in relation to local response. Firstly there was no structural mechanisms whereby the local voluntary organisations could communicate with incoming resources and plan rationally what resources are needed, e.g. they would find each other going in and out of the same house, whereas in the same block another 5 houses had no one at all. Secondly by the end of three weeks all of them were absolutely exhausted, which raised one of the other problems about the lack of back-up personnel to local people who get seriously exhausted by disaster response. There is a necessity for headquarters organisations to plan back-up teams to help local people.

Finally the State Government decided that there would be a Hailstorm Recovery Unit provided in the city of Toowoomba, that it should employ local people, that it should co-ordinate information for disaster victims, that it should act as an advocate for disaster victims, and in particular to insurance companies, that it should attempt to gather information about the effects of the hailstorm on the community, and in particular some groups within that community, e.g., one section of the community that was struck was a section of small crop farmers outside the city boundary. That unit operated for four months. It employed only three staff and it used 115 volunteers — local community leaders who had credibility with local people — and they systematically visited every house in Toowoomba that had been damaged by hail. One of the difficulties that results with disaster victims, is the crippling anxiety of how they are going to restore from their own resources. They sit in their homes, and if nobody goes to them, they sit longer and get more and more depressed. So one of the things about Welfare disaster service is it needs to "outreach" it cannot assume like ordinary welfare services that it is sufficient for clients to come to you.

Queensland – Inland River Floods 1976

The Inland River Floods of 1976, raised one of the other problems because it caused flooding on the State boundary of N.S.W. and Queensland. However that was a record flood and again memory of the earlier record flood, which was 1897 had been lost, and the community was very shocked that such a nice comfortable river could wreak such havoc on their community. One of the other consequences of the disaster victims is to re-adjust their perception to the nice place in which they live. Again State Government responded to the needs of 5 towns in the area, Warwick, Stanthorpe, Texas, Inglewood and St George, with Southern Flood Recovery Unit which again attempted to employ only local people, used local volunteers very extensively and existed for over a period of a month.

With increased governmental response, a number of communities are illustrating increasing sophistication in making sure that response occurs for them. In actual fact the number of people as opposed to livestock and riparian land was comparatively small.

Ingham – Flood 1977

The State Government very quickly committed manpower to investigate the need for allocation of welfare resources. Such investigation is an integral part of activating a disaster welfare recovery plan.

So that is a brief run down on what has happened in recent Australian history in terms of provisions of welfare services. It was necessarily brief, I am sorry about that but there are some source documents on some of those disasters.

WELFARE PLANNING FOR DISASTER VICTIMS

The purpose of planning for disaster victims is to enable as quick a recovery as possible of victims to their pre-disaster state. This has obvious benefits for the whole community. Another sub-purpose is to prevent the waste of human and material resources, both individual and organisational, which can arise from lack of planning or ad hoc response in the event itself.

The planning principles involved rest on the concept of a systems approach to local response and can sometimes be very easy for specialists to believe, that there is no local response. There is always local response. Sometimes it may be inadequate, because of the size of the disaster, which totally overwhelms local resources. We think planning with co-ordinations of resource sources, and resource allocation and the responsibilities of each organisation involved and the structural mechanism which needs to be established in the pre-disaster, pre-impact phase. Whilst planning should also take account of the most likely natural hazard in the local community and plan for that, I think there should be an inbuilt flexibility to cope with a whole range of situations which may occur. Planning should take account of communication networks, but also inbuilt communication control. A greater amount of resources can be wasted by people not knowing whom they should contact.

Status of present planning: State Emergency Services have their plan and mass emergency training. Recently there was a state conference of representatives, from all State Welfare Departments in Australia. Discussion ranged over plans for either mass emergency planning evacuation, mass feeding, mass clothing etc and the recovery phase, or in some states only the recovery phase, recognising in that instance the adequate preparation of the S.E.S. in the state and its far more adequate spread through the community, than most State Welfare Departments can provide. There is the obvious necessity to set up the structural communication network between State Welfare Department and the S.E.S., planning is taking account that welfare services are providing a back-up resource to a local community. There is no way that any of the State Welfare Departments, in their welfare plans are wanting to take over the community, either the responsibility or the therapeutic necessity for that community to be involved in its own recovery.

At the Australian level, Natural Disasters Organisation and the Department of Social Security and the Australian Council of Social Service are having continuing discussions about planning for the eventuality of a situation, similar to Darwin, which although the impact was quite contained, an Australia-wide effect was felt.

Social Needs of Disaster Victims

I want to talk briefly about social needs of people within those phases I talked about before, pre-impact, warning, impact, immediate post impact and recovery.

In the pre-impact situation people need to know what likely hazard they are going to face by choosing to live in a particular locality. This requires information to be made available, from a series of sources, to allow people to make adequate choices about where they live. People when they wish to, need the opportunity to be involved in community preparing, e.g., through S.E.S., and obviously one of the things that faces the S.E.S. is local participation. One of the things that always does worry me is the expectation by specialists, that people e.g., who live in flood plains are going to be as consistently concerned about floods as are engineers. On the basis of day-to-day life crisis as families they haven't got the energy to be daily concerned about the floods.

In the warning phase, people need adequate information on which to place an appropriate response. This raises the issue of the wording of warnings, about the distribution of warnings to meet that need for people to make choices about appropriate response, even though the most adequate information is not going to guarantee a 100% adequate response.

In the impact phase, there is very little that can be done apart from what their own family can do for them, in terms of shock, and in terms of preventing action. Obviously actions within the impact area, will depend on the pre-impact information of the nature of the hazard.

In the immediate post impact phase, people need to be contained within their social networks, and it should only be a last resort that families are split up, either by evacuation or by the provision of only one sex accommodation. People need access to adequate resources to assist them to maintain their livelihood.

Recovery phase. People need in the recovery phase, information about what will be done to help them, who is going to do it and why it is going to be done. The need for information is critical to assist people making their own recovery.

Economic Considerations within Welfare Planning

There has not been a great deal written about economic provision for disaster victims in Australia. There has been no information about what has been provided, there has been almost nothing done in terms of its effects, either to the disaster victims or the community at large. For example, in relation to Macquarie's statement, the Brisbane Courier of 1893 and in the Courier Mail in 1974, stated almost similar sentences about whether the community should continue to support those who continue to return to the flooded areas. This instantly raises the question of whether those people who chose not to live in risk areas, in disaster hazards areas, should subsidise the recovery needs of those people who do. That will always continue to be a raging community debate.

In the last 20 years there has been increasing property damage in the U.S. although with decreasing life loss, which is different compared to other countries, with the ratio the other way, with high life loss and property loss. Property loss was supposed to decrease by a large injection of federal funds into flood mitigation works through the U.S. Because flood mitigation has increased the safety of living on flood plains, more people are doing so therefore the property damage is increasing. That is one of the other economic considerations, about mitigation prevention, the unwanted effects of attempting to prevent

a community from suffering disaster. Another important issue in this area is that of voluntary relief funds.

You may be aware that by March 1974 there were 164 private funds operating in the State of Queensland for flood victims. This obviously lead to the State Government establishing a Thomas Hiley Flood Victims Fund. There are all kinds of problems associated with relief funds, and a number of these still have money in them, because under the terms of the trust they cannot be expended.

One of the other debates, which may shortly become a political debate, is whether or not the State should provide any funds to disaster victims of any kind. In some other states the welfare department is the body which dispenses State appropriated monies to disaster victims. In Queensland this tends to be the Treasury Department, through a Magistrate. A complicating factor in Australia is the Commonwealth-State Agreement for disaster funds, which means in Queensland that the Queensland Government has to expend some 2 million before it can call on the Commonwealth Government for funds.

Man Made Disaster -- Granville Train Disaster

In terms of preparedness for disaster in welfare services, there needs to be preparation for man-made as well as natural disasters. As you know the Granville train disaster occurred earlier this year, on a week-day morning and approximately 88 people died. Within three hours of that train disaster occurring, a psychiatrist and social workers from the N.S.W. Department were on the site, to deal with relatives who were needing to identify, in many instances, extremely mutilated bodies of relatives. They were there to deal with extremely upset rescue workers, and to deal in some instances with some very disturbed people, who came on a sight-seeing basis and broke down. They are still providing a bereavement counselling service, to the relatives of victims of the Granville Disaster as well as assisting in the dispersal of the very large public fund which was donated following that disaster, as well as in the dispersal of State compensation payments.

This raises the very real issue of bereavement counselling, both in natural disasters and man-made disasters. In relation to bereavement counselling we know a lot about the necessity to provide assistance to those who lose loved ones in very sudden and tragic circumstances. It was one of the things largely missing after Tracy.

I hope that today's seminar makes a significant contribution to preparation for the Australian Experience in Welfare Planning for Natural Disaster.

CO-ORDINATION OF WELFARE SERVICES

Carmel Daveson

I have been asked to talk today about the Co-ordination of Welfare Services in preparation for a Natural Disaster. Because of our time limitation I will select a few issues of the many which could be discussed.

Co-ordination isn't something which happens magically, it has to be planned for. This in itself is a problem as we have to plan for something which might never happen. At the same time we must hold ourselves in a state of readiness. A difficult situation when we are all volunteers.

It has been said by many eminent people that disasters, be they cyclones, bush fires, floods etc are not PHYSICAL events in themselves; they are SOCIAL events. By this I mean that the cyclone itself is not the disaster, although it has all the potential to bring about one. The degree to which it constitutes a disaster depends on (i) its effect upon human life, for example death, injury, depression, anxiety (ii) its effect on our essential services and on public and private property.

Our theme today is the HUMAN RESPONSE to disasters. When planning to cope with a disaster people usually focus on the physical services and one feels that the welfare services are forgotten or at the very least, seem as unimporatant. I would agree that it is absolutely essential to plan for the speedy restoration of our water supply, our electricity, our sewerage and to clear our roads. However, we must always be clear in our minds as to WHY those services need to be restored — because they are needed by PEOPLE.

PEOPLE is what disaster planning is all about. Our aim must always be to minimise the effects of the disaster on people by restoring the community to maximum effectiveness as quickly as possible. This will include providing the practical services and emotional and social support to people whilst this is being done.

Co-ordination of Welfare Services is usually put into the "too-hard basket". It is something everyone agrees with in principle, but no one wants to be involved in. Unfortunately people or organisations are suspicious of the word "co-ordination". They feel they will loose part of their identity if they liaise with each other or are co-ordinated. I don't support this attitude although I can understand and appreciate it. To me, co-ordination means, people working together, with a common aim, trying collectively to do a job of work which they could not do separately. Co-ordination of Welfare Services is about the efficiency of services, the rationalisation of services and most importantly . . . an attempt to provide total coverage of services.

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The Welfare system is a large network of services. It has a tremendous capacity for mobilisation in the time of a disaster. Within the system there is a considerable number of people with a large range of skills. It consists of the voluntary agencies e.g. the St Vincent de Paul Society, Meals on Wheels; the church groups e.g. Uniting Church, Salvation Army, Seventh Day Adventist, Catholic; Large Government departments with specific statutory responsibilities e.g. Dept of Social Security, Children's Services, Community Health; and most importantly consumer groups e.g. Nursing Mothers, Aboriginal & Islander Legal Aid, Solo Parents; and then numerous individuals with a desire to help but who don't belong to any particular group.

Within the system we know that some of the organisations are already geared to a disaster and have traditional roles to play e..g. the Red Cross with its tracing role, i.e. the recording of people and the locating of people. Other organisations have the potential to carry out different tasks from that which they are traditionally geared. (I will give an example of this later.) Other organisations will do what they usually do, but work on a large scale e.g. Community Advice Bureaux. The important point here is that each organisation in our community needs to consider what it might do in the event of an emergency, i.e. what its particular contribution might be.

Guesswork should be minimised. In planning to meet a disaster every community should know what resources it has in the Welfare field. It is not simply good enough to THINK that certain organisations operate in our community and ANTICIPATE they will respond in a certain way. We need to know the extent of our manpower and what experience and skills individuals have. We need to know where certain items like clothing, petrol, food, are stored in bulk and how quickly they can be obtained and distributed if necessary. We need to know how the large government departments might respond, for example, what resources will be available to our community for other cities e.g. Brisbane or Townsville to Mackay. We will need to work out shifts so that the post-disaster period will be coped with. I understand that the maximum number of hours a person can work is 48. The last thing that should happen is for everyone to work flat out and then have no one to take over. How badly our planning will be if we all become exhausted together. It is essential we PLAN for a disaster and that we review our plan constantly. The one thing we know for certain is that our communities are changing, and what will be suitable this year, will not necessarily be so the next.

We need to know the geography of our community well and plan our Welfare Centres so that they can be the focal point in each neighbourhood community. In my opinion, they must be within walking distance at least whilst phones are down, and the roads cut. The Welfare Centres must also have a wide range of functions in the immediate post-disaster period. Naturally, all this will depend on the particular physical and social characteristics of our communities. The importance of the neighbourhood Welfare Centres will depend also on the stages in the disaster. e.g. I would anticipate they would be of maximum importance in the post-disaster stage, and will decrease in importance in the recovery stage when there might be larger Information Centres.

Communication between Welfare Centres and between the Co-ordinator and the Welfare Centres will be essential. It will be essential for the Welfare Centres to be in touch with people in charge of supply of clothing, fuel, food, medical care etc. In one neighbourhood in a large city, one church group may be in charge e.g. the Seventh Day Adventist Church because they may have many of their parishioners in that neighbourhood. In another neighbourhood, the Parents & Citizens group may have the main responsibility for the Welfare Centre, and members of the Seventh Day Adventist Church might be involved in the Centre. All this needs to be worked out, so that we haven't five agencies doing the same thing and no one doing some things just as important.

How can we achieve co-ordination? How can we persuade groups to work together. How can we get the various organisations to indicate what their organisation does and what it feels it can do in an emergency? How do we discover what contribution the Government Departments might make? The Government Departments have their specific statutory

responsibilities and any community could expect they will know what their role is in the disaster, be it the post-impact or recovery stage.

Co-ordination will only be achieved if the groups and individuals are given the chance to consider what part they can play in a disaster, have respect and confidence in the co-ordinator of Welfare Services, and are convinced that maximum results will be achieved if they work together instead of going it alone.

Some organisations, when initially approached about their contribution, may consider they have no part to play at all, e.g. a Progress Association. Frankly I doubt if an organisation exists which couldn't contribute in some way and it is our task to look at various possibilities with them.

To illustrate this point, I will give you an example of what I mean. I will take a charitable group which people would consider had a very specific role to play in a disaster, and show you what a major role it could play if used to its fullest potential. The organisation to which I refer is the Meals on Wheels.

All of us are aware of the valuable contribution the Meals on Wheels Association makes in any community in normal times. I have heard it said that in a disaster the Meals on Wheels could supply "x" number of meals when emergency power had been restored. People have argued that until they have power their contribution could only be minimal, particularly as one could anticipate there could be no fuel, water and cars. I totally reject that line of approach. I believe their contribution could be enormous even without power. Of course they will not be able to provide meals in mass without power — they will not be able to cook and deliver meals to the frail and isolated aged and disabled. But consider what else they could do.

In the pre-impact stage when the community has been alerted to the possibility of a cyclone, they could check the list they use to deliver the meals. What a valuable list this is. Some of the people on the list will be frail, some very elderly, some disabled, some without friends or family, many without telephones. This list would comprise one of the most vulnerable groups in our community.

Once the list has been checked it could be handed to the District Controller or his delegated person, to use at his discretion once the extent of the disaster was known. This presumes of course, that the person's initial permission had been obtained so that their name could be used in this way. In the post-impact stage the District Controller could quickly assess the extent the disaster has caused difficulties to this group of people.

Also in the pre-warning stage, the people who deliver the meals could call on the elderly etc, perhaps deliver some tinned food and make sure the person has water, etc, on hand. They could talk to the person and see if he wants to be with friends, or in an emergency area, or to see the disaster out alone. I would imagine that the Meals on Wheels workers could be assisted in this task by other groups e.g. the District Nurses and the Sister at the St Vincent de Paul Home Nursing Service.

In the post-impact stage, the people could be again visited so that we would know if the elderly people had coped with the disaster and the extent to which assistance might be required. More tinned food, etc, might be delivered. If necessary the person might need to be taken to friends or to a Welfare Centre. One thing we must remember is that the elderly hate to leave their home if it has been devastated or badly damaged, as they are fearful that we, the community at large, may not let them return. Once the emergency power has been connected, the organisation could then go about cooking and delivering its meals. It would also be expected that it would cook and supply extra meals for the people whose homes have been devastated, or for those people who had not made provision for burners, etc.

The point I am trying to make is that in planning to meet a disaster each agency or organisation needs to consider very carefully their contribution at all stages of the disaster

as they might be able to do many more things than they originally thought they could.

The key to making the most effective use of our resources in each phase of a disaster is the co-ordination. There must be someone or some group whose responsibility it is to have an overview of the total situation. The co-ordinator will need to have very special skills and must have the confidence of the organisations with whom he liaises.

One of the biggest pitfalls in co-ordinating services is to expect too much from any one group doing a particular job of work. All of the people in the voluntary groups, consumer groups, government departments, churches, etc., are already very committed to the job of work they are doing at the moment. So when we involve them in disaster planning we need to consider carefully our expectations of them. Meetings should be kept to a minimum. Training must be specific and geared to the job they will be doing. If we demand or expect too much from the welfare sector, as any other sector, people will shy away from us and we will not get anywhere. What needs to be done is to find out what people feel they can contribute, make a careful assessment of what might need to be done in a major disaster, and then get the groups to discuss how they can work together, and what gaps they feel exist. It is impossible for any one of us to do everything really well. We need to trust each other and our Co-ordinator of the welfare services.

An important point which was raised earlier was the involvement of the volunteer who does not belong to a particular organisation. Without a doubt, many volunteers will emerge once the disaster has struck and the need is very urgent and apparent.

I believe we should encourage as many volunteers as possible to indicate their interest in being involved BEFORE we meet the disaster. An assessment should be made of their particular skills, interest, past experience and future potential. For example some women may have had nursing experience ten years ago, and may indicate interest in caring for children. Other people may indicate skill in cooking, etc.

Once the disaster strikes, the same thing will hold. e.g. Assessments should be made of the volunteer who should be used if at all possible. I believe this is so important that several people in our community should be allocated the task of working with the volunteer i.e., their task will be to assess how the volunteer can be used and then to offer support to the volunteer whilst they are fitting in. Thus this person would mobilize the volunteers and be the link between them and the people who have been trained to meet the disaster.

There are numerous issues which we could consider this afternoon but we haven't the time e.g. Many of us will need emotional support after the disaster. Some of us will be depressed and very anxious. We may need practical information regarding pension cheques; we might need to know where to get nails or food. We could talk for some time about how the geography of our area will influence our choice of welfare centres. We could discuss population distributions and consider gearing specific services to vulnerable areas e.g. elderly communities; one-parent families, etc.

Finally and importantly we could discuss the co-ordination of services in the recovery stage. I often liken the recovery stage i.e. the stage when the state of emergency no longer exists, to a death of the husband or father in the family. When the husband dies practical assistance and emotional support to the widow is usually abundant in the first week. Two weeks later there is often no one around for the widow to talk to. . . . . everyone has gone home. My fear is that once the state of emergency has been declared everyone will rally around and a tremendous job of work will be done. But after that WHAT? Many people will need long-term assistance. Many might need to make a fresh start in life. Naturally our first priority must be to plan our co-ordination of the welfare sector to meet the post-impact stage of the disaster, but after that many services will still be needed.

Our cities and towns exist because people live there. The extent of the disaster will depend on the degree to which it disrupts our normal daily living. In planning to meet the disaster we must remember we are planning for people. We need to assess our human resources as well as our physical resources. We need to plan for each phase of the disaster and for long-term recovery. We need to plan now, and we must continually review our plan. The co-ordination of welfare services to meet a disaster is really about people WORKING TOGETHER to meet each other' needs.

WELFARE SERVICES IN NATURAL DISASTERS: THE TOWNSVILLE EXPERIENCE

Robert Hinds

Townsville is situated in that part of Australia which is regularly subject to the ravages of tropical cyclones. Three have caused serious damage to the city in the past century, and every cyclone season brings with it the possibility that Townsville will suffer a similar fate to Darwin with Cyclone Tracy.

This paper is an attempt to describe some of the work carried out by welfare personnel in Townsville following Cyclone Althea in 1971-2, and in the evacuation through Townsville of some of the victims of Cyclone Tracy in 1974-5. The development of the present state of planning by some of the welfare agencies will be shown to have its roots in the above two experiences.

Cyclone Althea:

Very seldom is the need to co-ordinate the use of scarce welfare resources so apparent as in the aftermath of a natural disaster. Agencies which traditionally operate in isolation discover a camaraderie which would previously have been unthinkable as they work to overcome common problems. At least, such was the experience of Townsville in the months after Cyclone Althea struck on Christmas Eve, 1971.

Previous plans to co-ordinate services had been carried out through the State Disaster Relief Organization. These plans however were largely directed at restoring the physical infrastructure, and although some welfare organizations were involved there was no specific plan to co-ordinate their efforts.

Althea could be described as "moderately severe": three people were killed and a number injured. Fifty percent of the city's housing was damaged in some way, with possibly ten percent totally destroyed. There was widespread disruption to power and communications. Streets were blocked by debris, and much of the city's stocks of food had to be dumped because of loss of refrigeration. Fortunately, Townsville was spared the devastation which would have occurred if the eye of the cyclone had passed over the city or if the storm surge accompanying it had developed at high instead of low tide.

In the days immediately following, the emphasis was on making temporary repairs to dwellings and in restoring essential services. It soon became clear that many welfare-oriented problems had been created. The Chief Health Inspector of the City Council was the officer instrumental in achieving the integration of social workers in the work of the S.D.R.O., and the activities of these people were co-ordinated by the then Senior Social Worker with the Department of Social Service, Miss Moya Crowe. They worked initially from the regional S.D.R.O. headquarters in the Police Station, and then from the Civil Defence headquarters. Approximately ten days after the cyclone, the S.D.R.O. withdrew from the relief effort, and an "Information Centre" was set up in the Health Department of the City Council, under

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the direction of the Chief Health Inspector. This Centre was staffed by social workers and members of St Vincent de Paul Society who provided direct access to that Society's resources.

The activities of the post-impact phase largely consisted of responding to requests from Civil Defence personnel for assistance with difficult human problems, typically the elderly lady who refused to leave her severely damaged home for fear that she would not be permitted to return to it. Many referrals were made to voluntary agencies for assistance with food and clothing. As time progressed and it became clear that long-term accommodation would be needed for a number of families, representations were made to the Housing Commission and eventually the delapidated cluster of buildings known as Stuart House, and formerly occupied by students, was allocated for this purpose. Assistance was also given to victims to find their way through the maze of relief schemes which developed.

As the recovery phases of the disaster progressed, the casework to individuals continued. Some of the relevant activities included negotiating on behalf of our clients with the Premier's Department for increases of inadequate grants, and of assisting clients in their discussions with insurance companies. Regular visits continued to be made to the residents of Stuart House until they were all finally resettled. Most of this work was performed by social work staff of the Townsville office of the Department of Social Services, which was reinforced by two additional members loaned by the Brisbane office. Other social workers throughout the city also carried on cases from their period in the Information Centre.

Developments Between Cyclone Althea and Cyclone Tracy:

Experiences in the relief effort had convinced most members of the welfare community of Townsville that there was a need to be prepared for the next eventuality. This belief gave a major impetus to moves already under way to establish a Council of Social Services in Townsville: the Townsville Welfare Council came into being in mid 1972. Later in the same year, a Sub-Committee of this body met to make specific plans for co-ordinating the activities of the welfare agencies. This group was initially seen as being under the control of the Health and Welfare Commander of the S.D.R.O., but over the next two years, it came to be seen as an independent body in its own right. Its activities were intially envisaged as an expanded version of those carried out after Cyclone Althea with a number of refinements shown up by the experience.

These activities gradually became replaced by a much more ambitious programme including the co-ordination of the activities of voluntary organizations and volunteers, arranging the registration of disaster victims and of providing resources to other agencies to enable them to carry out their tasks. The acceptance of this range of activities by the authorities was largely due to years of dedicated work by Miss Gwen Gorman of the Social Security Departmant.

Cyclone Tracy:

To anyone involved in the evacuation of Darwin following Tracy, the memory of the end of 1974 and the beginning of 1975 is one of incredible confusion as tens of thousands of people left the shattered city to travel to all parts of Australia. The "Golden Rule of the Evacuation" was that nothing happened as one had previously been advised that it would. Jumbo jet-loads of evacuees were alleged to be arriving, one made preparations, and then plans were changed.

Despite the confusion, about two thousand evacuees managed to reach Townsville by road, rail and air. For most, the city was merely a transit point, although a few made it their final destination. On the outward journey, they were tired, ragged and destitute. A number were grieving for lost spouses killed in the cyclone and all suffered the shock of seeing homes and possessions which had represented security to them totally destroyed in a few hours of nature's fury.

The effort which was mounted to provide help was a co-ordinated one involving elements of the Department of Social Security which provided financial assistance, Manufacturing Industry which provided further travel, the Salvation Army which provided clothing and personal requisites, and the State Emergency Service and the Welfare Council's Disaster Sub-committee which provided trained manpower.

As in Cyclone Althea, the question of a suitable venue for the relief operation quickly became a relevant issue when the State Emergency Service which had been used as the nerve centre of the operation closed down after the Christmas break. Local politicians who had been heavily involved arranged that operations continue from the City Hall, where a reception centre was set up. Here, incoming evacuees were received and registered by a volunteer, could be given financial assistance by a Social Security representative, clothing and food by the Salvation Army, and then accommodation could be arranged at the Army barracks. This system operated until the flood of evacuees had become a mere trickle, when it was handed over to the social workers at the Social Security Department.

In the longer term, the activity largely centred around assisting people in obtaining their entitlements under the numerous relief schemes which surrounded the evacuation. A "Darwin Club" was formed to boost the morale of, and encourage self-help among evacuees, but the number of those resident in Townsville was small, and only a few meetings were held.

Since a number of the major difficulties in executing relief programmes were common to both the Althea and Tracy situations, they will be dealt with together.

Having said that, I will first discuss a problem which related in Townsville to Cyclone Althea alone — the long-term housing situation. It took nearly a year for the last of the victims of the cyclone to be removed from Stuart House to other accommodation: there were a number of causes for this delay. Firstly, there was the destruction of the housing stock resulting directly from the cyclone. Secondly, there was a general housing shortage caused by Townsville's population boom. This had two aspects — industrial development and the military build-up in Townsville. Thirdly, the nature of the people involved may have affected the speed with which authorities reacted. Most of them were old, poor and/or from single parent families, and they tolerated the conditions at Stuart House without a great deal of complaint.

The major problem area common to both disasters was the relief fund. In Townsville, after Althea, structural damage to property where insurance was inadequate was repaired under grants paid by the Premiers Department through the Queensland Housing Commission. Furniture and effects could be replaced from funds administered by the City Council and collected as the result of an appeal launched by a local radio station. A Rotary Club also provided furniture, the St Vincent de Paul Society provided cash, foodstuffs, etc. as did other voluntary agencies.

Needless to say, problems arose with this situation because of its very complexity. One client of mine thought that she was ineligible to claim from the Council fund if she had approached the Housing Commission, and so did not receive assistance in having destroyed furniture replaced.

Following Tracy, the situation which applied was that damaged property was replaced under compensation provisions, grants were available from the Darwin Relief Trust Fund, and six weeks of Special Benefit payments were made by the Social Security Department. In Townsville, other needs could be met by funds operated by the Red Cross and the Townsville Welfare Council. There were delays of varying lengths in receiving major grants in Townsville, ranging from a few weeks for Darwin Relief Trust Fund grants to many months before the Compensation Scheme was organized and put into effect.

However, the major problem which arose in this area occurred before most of the funds above were in operation. A large number of people coming through Townsville had special needs which could not be met by Special Benefit payments, e.g. sufficient money to

purchase special clothing not available through relief agencies. The local Mayor refused to allow any of the money collected locally to be used for these purposes. All of this money was forwarded to Brisbane for inclusion in the Darwin Relief Trust Fund, the proceeds of which were not available until much later. It took a campaign of press publicity before the matter was rectified by the citizens of Magnetic Island who collected funds specifically for local use.

Planning for Disaster Welfare in Townsville:

To date, the planning of the welfare field through the Townsville Welfare Council's Disaster Sub-Committee has concentrated in two areas — listing and recording the local resources which would be required and made available in the event of a major natural disaster, and developing a group of trained people who would be prepared to assist.

The basic plan involves existing welfare agencies, such as the Salvation Army, continuing to function as independent entities with additional resources being provided as necessary. Agencies are to be grouped together to make up for known deficiencies in their resources. For example, the Seventh Day Adventist Church has a large camping ground and a well-drilled team prepared to assist in providing accommodation in the south-west of the city. However, they have no reserves of clothing. Such reserves are held by the St Vincent de Paul, which is prepared to assist.

Current planning envisages that the reaction of the welfare agencies should be independent of the State Emergency Service, and as such should have a seat on the District Control Group of the State Counter Disaster Organization, the wider co-ordinating body. This will enable some degree of co-ordinated welfare effort to continue from the beginning of the relief operation for some months if necessary, without the discontinuities of location or leaderships inherent in being part of a S.E.S. operation. By way of explanation of the above, most S.E.S. operations tend to be limited to the post-impact stage and are geared towards a maximum effort for about seven days, whereas the welfare needs of the community resulting directly from the disaster will be evident for as much as two years.

Current Gaps in Planning

I see several main gaps in preparedness at this stage. The first is that of the problem of the delivery of financial assistance at the point of need. The scenario which is played out will probably be similar to the following: **(a)** immediate and limited financial help from the Magistrates' Court to relieve personal hardship; **(b)** Special Benefit payments from the Social Security Department to those who have lost income; **(c)** at a later date, assistance to restore damaged dwellings from the State Government; **(d)** distribution of any funds received through appeals, and; **(e)** cash and kind assistance from traditional sources of such relief, i.e., Salvation Army and the Red Cross. The possibilities of overlaps and gaps in this complex network are obvious.

The second main gap is the lack of basic information to serve as a basis for planning. For example, there is no estimate available, as far as I know, of the destruction likely to be caused to houses by the various levels of storm surge. If it were known that a given surge level at a given stage would result in the destruction of X percent of the housing stock in affected areas, the amount of emergency accommodation likely to be needed could be known with adequate precision and advance preparation could be made. If a high percentage of the housing would be totally destroyed, then it is clear that temporary accommodation would be required for many months, and plans for tent cities, new caravan parks, or large-scale billetting could be drawn up now, rather than waiting for some future disaster.

Finally, and this is not a matter purely for the welfare field, a massive education campaign is needed to alert people to the dangers of cyclones and storm surges, and to the possibility of an evacuation being necessary. Without this education, the direction to evacuate low-lying coastal areas if a surge is forecast could largely go unheeded, and Townsville could be the scene of a disaster not much less devastating than that which occurred in the Bay of Bengal.

CO-ORDINATING WELFARE SERVICES: CAIRNS, N.Q.

Ian McAlister

This paper will be addressing itself to the co-ordination of welfare services within the framework of an anticipated natural disaster and particularly to those services already co-ordinated under my direction and control. I might first point out that the welfare services of which I speak have never been tried in a fire, at least not since my involvement in them. We're all dressed with nowhere to go! Yet, while there would be some wrinkles to be ironed out in actual emergency conditions, I do believe we have in this city one of the best disaster welfare services in the state. At least on paper. I owe a great deal of this welfare services structure to my predecessor, Mr Terry Simpson, who is now also one of our deputies.

It may be already obvious to you that there has been a singular lack of natural disasters in this region since my assumption of the mantle of Welfare Co-ordinator. Because of my occupation, some may call it coincidental, others may call it influence. I understand there are those who would take the former view but there is an equally strong body of opinion which would hold that it was all due to my boss, or even perhaps because I have some influence or sway with him. Just to put the record right, let me state categorically that the actions and thoughts of the sales staff are not necessarily those of the management.

I am not so stupid as to suppose that because of some spiritual force which we may be able to bring into play, we therefore should dispense with any preparations we might make for emergencies. Nor am I so stupid as to discount one iota of the effect which prayers have upon the world around us and the people in it. I do believe quite seriously in prayer and in using that common sense I trust we all have. It's not an each way bet, that's the way things are.

So much for the diversion. Let's get down to Business. I wish to deal first with **The Task**, then **The Structure**, and finally **The Future**.

The Task:

Welfare may be described as "the care of the physical, emotional and spiritual needs of people when they are unable to care for those needs themselves". Welfare does not have the highly dramatic skill of the rescue team, or the highly audible skill of the communications team. And it is precisely because it is neither dramatic nor attention-getting in its task that welfare units have something of a reputation for being either a mobile kitchen or a crying room, staffed by women oreffeminatemen — the sort of place one only goes to in an absolute emergency. A bit like a public toilet. If I succeed in doing nothing else, I want to banish such thoughts from the minds of those who think that way. Welfare service will feed you and will comfort you if you have that need. But welfare is more than that, just as your home is more than just a place where you eat and sleep.

Fr Ian McAlister: Rector, St Margaret's Church of England, W. Cairns.
Liaison Welfare Officer for State Counter Disaster Organization Cairns and State Emergency Service (Far North Region). Member of Civil Defence Rescue Group and Emergency Fire Service Crafers, S.A., 1965-8.

If my definition is correct, then we might be able to say that welfare is more of a job than any other simply because it needs *more* skills *more* often. It should not be dismissed lightly by saying — "We'll get the ladies to look after that". I am not a chauvinist: I am merely stating that welfare is the business of caring for people in their need, and that need has to be met by the most highly skilled people available. Those highly skilled people more often than not have to work longer and at full tilt than others, often overtaxing all their resources. To those local controllers of State Emergency Service, I say that if you have not the most highly skilled and qualified personnel in your welfare teams, then you should have. If you are one of the 'leave it to the ladies' people, I beg you to get rid of the idea. I am ***not*** being anti-woman. I *am* pleading for an attitude which sees welfare as highly skilled and trained as any other unit in disaster welfare.

The task of welfare is to concern itself with people and the difficulties they happen to be in at the time. Most often that care is short-term. The welfare service does have a decreasing role to play as the community begins to re-establish itself. That process may take up to six months, by which time the helping agencies existing under normal conditions should be able to take over. In the absence of statistics, I would venture to say that emergency care diminishes to the extent and at the rate by which normalcy and re-establishment takes place.

I said the helping agencies which exist under normal conditions should be able to take over any care needed: this is longterm care. As far as I am aware, there has been little work done in this area, the area of post-disaster welfare planning in the long term. It would be my contention that people or groups which come into care under these conditions tend to get the 'too hard' treatment. It would almost seem that the helping agencies are not all that capable of offering much meaningful longterm care. Nor does there seem to be much co-ordination of care in these circumstances: it may be a thorny nettle to grasp, but I would like one of the workshop groups tomorrow to have a go at coming to grips with it.

My task as Welfare Co-ordinator is to co-ordinate the welfare services which are available to be used in emergency situations. To look further, let us turn our attention to the structure of the service and to see there how we have sought to put that short-term welfare care into practice.

The Structure:

I now want to don my other hat — the State Emergency Service welfare hat. I want to put this one on because it is the S.E.S. welfare unit which forms the basis of the structure of the total welfare service. As you can see by Diagram A, the S.E.S. teams are based in preselected localities in and around the city area.

The welfare teams from other branches in the area would not have the same proliferation of population, facilities, or potential units to be cared for: but, apart from that, details fairly much approximate. Each of the Cairns centres has an appointed leader who is responsible for the running and staffing of that centre. In most cases, there is a deputy leader as well. The leader has been in liaison with the person in charge of the school or showground and has established access and use of facilities.

It is a deliberate policy of this welfare service to have a small number of trained personnel who have the ability to run the centre by themselves with a number of untrained volunteers. This policy is built into our training schedule and is done this way because we have found that large welfare teams are unwieldy, while small ones are far more mobile if a shift of site is necessary. it is also far easier to combine smaller units to make a larger one should the occasion warrant it.

Our S.E.S. training seeks, in effect, to make each S.E.S. team leader a co-ordinator of the welfare services in his centre. I believe it is important, not only for those reasons I have outlined above, but also for the centres themselves. For if they are to be efficient units,

there must be someone there who is able to maintain their efficiency. That person is the team leader.

Into that network of centres, set up by S.E.S., we inject the specialized members of the State Counter Disaster Organization, for which I am also responsible.

(a) *The Red Cross* takes care of the registration of people when they come to the centre for assistance.

(b) *The Salvation Army* and *The Seventh Day Adventist Church* set up canteens in each centre so people may be fed.

(c) *The St Vincent de Paul Society* has the responsibility at each centre for the issue of clothing.

(d) *Medical Practitioners* who have indicated their willingness to be of help move to their nominated centre to carry out any procedures considered possible and necessary.

(e) *The Clergy* take care at each centre of situations appropriate to them.

(f) *Social Workers* are mobilised to centres to handle the wide range of personal services.

In addition, we add a radio operator and possibly a first aider, and we have a team of ten or so, expertly trained and skilled personnel. One is the more easily able to cope with the other untrained volunteers in that sort of situation than in an overstaffed, top-heavy welfare centre where there are too many of the proverbial chiefs and not enough of the indians.

It is my understanding of natural disaster planning that there is in the community a large body of people who are willing to be of assistance in or after the emergency but are not invovled in any of the structured groups. They are the ones who are on one's doorstep at the double offering their services in some way. In many of these cases, the individuals concerned are skilled people whose skills are particularly needed, e.g., industrial safety officers and cooks. The mobilization of these untrained volunteers is a very complex one. I would be greatly heartened by the workshop tomorrow giving an opinion on how we should go about handling such volunteers. Should they, for example, be asked to come to one or two central points other than established centres, and be allocated to work from there? If that is the case, who is to do the job of co-ordinating that centre?

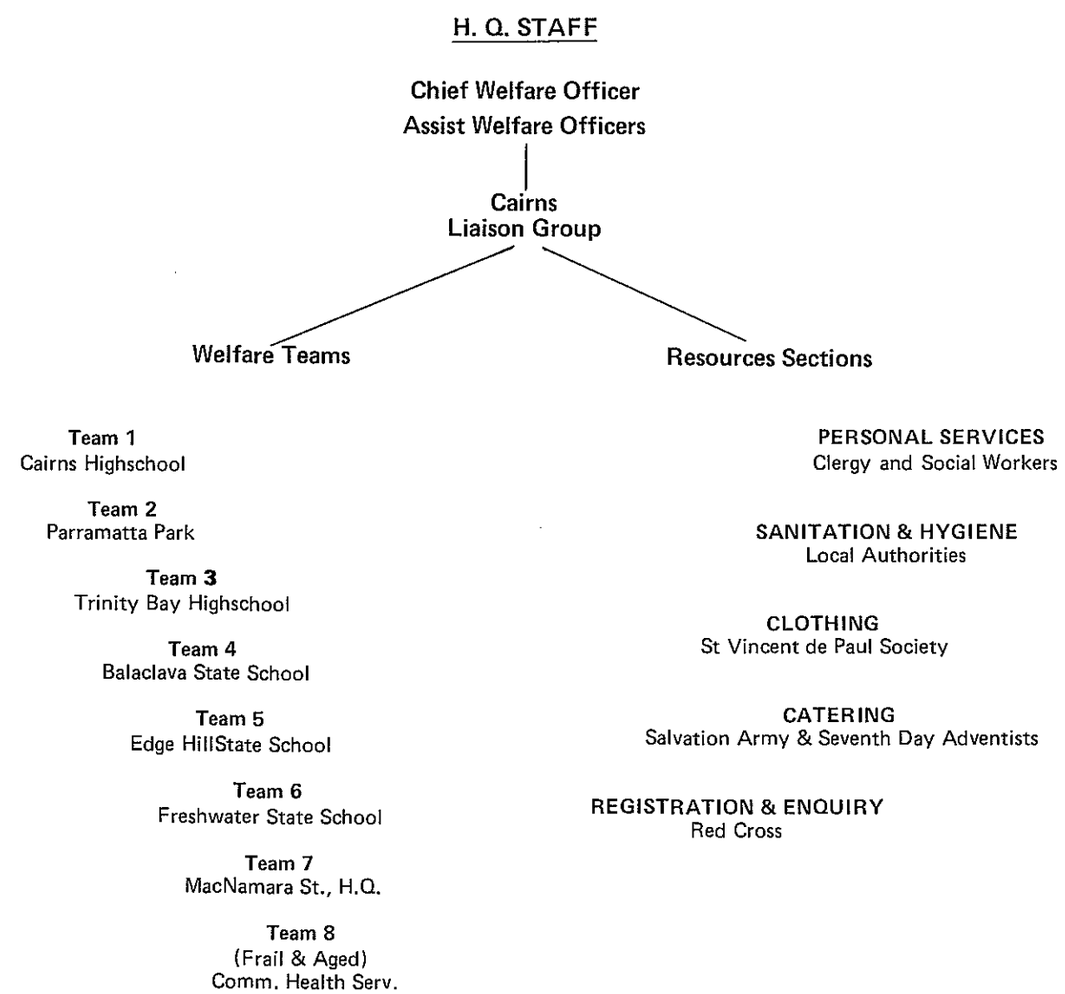
The Future:

I have no intention of being a prophet, and in religion, the practice of crystal ball-gazing is not on. But let me say this: welfare services are only as effective as the people in them. They are only as efficient as the training and skill-achieving they have had is adequate to cope with natural disasters. They can only be co-ordinated to the degree of willingness of individuals and organizations to be co-ordinated.

I do believe the base I have described is too narrow. We need more teams. We need more centres. That will not be achieved by my cajoling, ordering or abusing you. That base will only be widened by your response, your preparedness to be involved now rather than when it happens. When people are seen to be involved and are observed to be efficient in their environment, then those others for whom they will be caring can have their fears allayed, and their needs properly attended to. And it is only then can it be said of us that we will be doing the job.

DIAGRAM A.

CAIRNS/MULGRAVE WELFARE PLAN – STRUCTURE



SOCIAL PLANNING IN THE CONTEXT OF NATURAL DISASTER

Joan Innes Reid

Earth's inhabitants have long been subject to natural disaster: they are events of nature older than human history. But, until the second half of the twentieth century, there has been little attention paid to recording, researching and analysising the coping mechanisms used within communities after a major social discloation precipitated by a natural hazard.

Documentary evidence of community responses in Australia to natural disaster – stress reactions, utilization of inner resources, regenerative capabilities – actually dates from 1967, little more than a decade ago. Is it reasonable to correlate both community awareness and concern with the contemporary technologies of communication – film, television, radio, tape recorder – which, by means of visual and sound effect, have served to heighten and sensitise the collective consciousness as to the effects on people of extraordinary events? With an eye to the news value of the human drama being played out, the news media have highlighted natural disaster as a community-type catastrophe, spelt out in human anxiety, suffering, separation, injury and death. One dramatic portrayal of this is the documentary film – *'When will the Birds Return'* – depicting the aftermath of Cyclone Tracy, 1974, with its focus on the shattered homes, and disruption of family and community life in Darwin.

While psychological and sociological aspects of natural disaster are newer areas of research in Australia, physical and social scientists would agree that natural disasters are those natural hazards which have disastrous effects on human settlements. They are no respectors of persons; they strike at no particular socio-economic levels. With apparent egalitarianism, they vent their fury on all who happen to fall within their path of destruction.

There are, however, differential effects on the population: in any given community, there are identificable groups of vulnerable persons – the very young, the very old, the frail, infirm, and handicapped, the dependent, the confused, the psychologically unstable, and those who have difficulty coping in even normal circumstances.

Other categories of vulnerability have also been designated as post-disaster victims: these are the groups with little or no cash reserves, the marginally financial who are non-insured or under-insured, and who, if subject to property losses, suffer a situational type of poverty. These economic victims were identified and described by Bruce Buchanan, Executive Director of the Queensland Disaster Welfare Committee, at the time of the Brisbane floods in 1974.

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Organized Seminars on Natural Disaster and Community Welfare, Townsville, 1977, Mackay and Cairns, 1978. Editor of Seminar Proceedings on Natural Disaster Community Welfare, published James Cook University, 1978.

In 1977, when a survey was commenced in the Behavioural Sciences Department of James Cook University of the extant literature in Australia on the observed effects of natural disaster on communities, it was discovered that the first serious attempt at collecting and recording social data relating to a large civilian crisis occurred in 1967 in the context of the Tasmanian fires. Pioneering developments in welfare organization at that time are described by Ann Quinnell in her paper. One landmark in welfare planning was the establishment of the Tasmanian Fire Victims Welfare Organization, a co-ordinating body incorporating government and voluntary human service organizations. The T.F.V.W.O. functioned for eight months and, before disbanding, made recommendations to the Tasmanian Government to provide mechanisms for advance welfare planning in anticipation of community crises.

Out of this holocaust rose, Phoenix-like, the configuration of a disaster welfare structure, in which social workers played a key role. In 1969, Roger Wettenhall was able to comment that the Tasmanian experience had established a precedent for bringing people with a social work orientation into the disaster team.

In tropical Australia, the first prominent milestone in welfare planning as part of a counter-disaster effort, occurred four years later in the post-impact phase of Cyclone Althea in Townsville, 1971. A Christmas Eve extra, Cyclone Althea struck the city on December 24, causing some fifty million dollars of property damage, much of this in total or partial destruction of occupied houses. Social and welfare workers, about to enjoy their Christmas holiday break, volunteered their services, and were eventually given office space in the State Counter Disaster Organization, under the leadership of a social worker employed in the Department of Social Security. This nuclear group became a task force concentrating on the people most adversely affected by the cyclone. An early discovery was that the people most in need of help were the least able to present at centralised offices. Reconnaissance teams found elderly persons sitting forlorn, vague, immobilised, in their unroofed houses, amid collapsed walls, suffering a reaction which has been termed *'disaster syndrome'*.

Out of the experience of welfare personnel involved in Cyclone Althea came a new set of working principles for welfare management of disaster:-

Welfare-oriented field workers are needed to provide an advance-base service to identifiable target groups — the housebound, frail aged living alone, functionally handicapped, and at-risk families. Field workers need to be deployed, in the immediate post-impact phase, into the community to locate, reassure, counsel, and ensure appropriate social and emotional help for victims.

Value of volunteers. In the post-impact period, a social reaction known as 'convergence syndrome' is likely to occur. People converge on the centre of operations, some merely curious, the majority genuinely interested to help. After Althea, the volunteers who presented found the welfare personnel too engrossed in the delivery of welfare to organize these fresh volunteers. A lesson learned from Althea was that volunteer recruitment, and the orderly utilization of community manpower and resources need to be preplanned before there is a disaster.

The need for a welfare structure. A third lesson, confirming the experience of the Tasmanian fire disaster, was the need for a welfare structure of the human service organizations, both statutory and voluntary, which would fulfil a series of functions: develop a mutual awareness and appreciation of the objectives, methods, personnel, resources and coverage of each member organization; minimise overlapping and duplication of services; and concertedly consider potential threats to at-risk groups in the community. Prior to Althea, the major welfare organizations maintained their traditionally independent modes of providing their specialized services, working at extraordinary pressure from their own centres, but with limited cross-reference to each other. The consensus of social and welfare workers involved in Althea was that a co-ordination of the major dispensers of welfare in the community would be the most effective strategy for programming a comprehensive delivery of welfare services in a time of disaster.

In the two years prior to Althea, efforts had been made in Townsville to constitute such a co-ordinating body, which was initially known as the Townsville Welfare Forum. In those two years, the concept of a combined approach in order to consider the city's welfare needs was not attractive to the welfare organizations. The objectives were considered too vague, and the machinery too complex for the stern realities of voluntary associations preoccupied with providing their own specialty of service. To look beyond their particular charters at the total community, their inter-dependent relationship with it, constituted an extra and unpopular demand on people already committed, and beset with perennial shortages of finance and volunteers.

The need for welfare energies to combine for planning purposes.

Althea pointed up the need for pooling welfare energies for disaster planning in order to maximise the area and thrust of welfare delivery systems. As a response to this perceived need, the Townsville Welfare Council was formally established in the months following Althea (February, 1972). It was to have two functions in a disaster situation — to effect linkages between official government welfare services and voluntary agencies; and to develop welfare strategies for dealing with a major community disaster in Townsville.

Later in the same year, the Townsville Welfare Council moved to formalise links with the official counter-disaster group, by nominating from its membership two welfare co-ordinators who constitute a new arm of community welfare planning within the structure of the State Counter Disaster Organization. The concept of welfare co-ordination transcends the historically separatist practice of operating human service organizations within a community, replacing it with joint pre-planning, interlocking and rationalizing of the community's welfare resources and energies.

A welfare unit in the counter-disaster structure operationalizes a vital community feed-back mechanism — keeping the administering authorities informed of the problems, needs, and concerns of those who are adversely affected by disaster.

When the post-cyclonic torrential rains descended on the Brisbane area in January of 1974, causing massive flooding and threatening dense centres of population, there was no pre-existing welfare structure ready to move into action. But there was an awareness among welfare personnel that vigorous and concerted action was required. And so, twelve hours before the foods peaked, welfare organizations were called together. The outcome was the formation of the South Queensland Flood Relief Committee.

The Queensland Government provided social workers from its vast health and welfare network to mount a welfare operation. These state employees were seconded from normal duties to plan and implement emergency welfare programmes: a significant policy decision, indicating recognition by the Queensland Government of the role of social workers in counter-disaster operations.

The calamitous floods saw a new mode of delivering welfare services — the establishment of *'one-stop centres'* a concept developed out of the exigencies of previous disasters. Strategically sited in the affected surburbs, these centres became the hub of the counter-disaster welfare support system, ensuring for flood victims easier access to the array of community welfare services.

From the organizational nucleus of the Flood Relief Committee emerged the Queensland Disaster Welfare Committee — a co-ordinating body of representatives of national, state and local government departments, plus the major voluntary welfare agencies. The membership of this Committee offers guidelines for combining the energies of relevant community services: the Australian Department of Social Security, the Department of Children's Services, Queensland Local Government Association, Australian Association of Social Workers, Royal Flying Doctor Service, Queensland Council of Churches, Red Cross, Salvation Army.

In reports compiled by the Queensland Disaster Welfare Committee, the effects of the floods on the community were recorded, the data processed and submitted to the authorities. Newer assessment and evaluative processes — in research and analytic techniques — were being applied to improve the understanding of the nature and extent of a disaster-engendered civilian crisis.

Ann Quinnell, in her Executive Officer's Report to the Queensland Welfare Disaster Committee, made this comment on the Brisbane floods — "I hope that no welfare personnel in Australia ever again have to begin planning a disaster recovery programme during the impact phase of a natural disaster". Her hopes were not realized. Eleven months later, Cyclone Tracy pulverised Darwin. When Tracy literally passed through Darwin city on Christmas Day, 1974, there was no welfare-based co-ordinating body ready to go into community action.

Major-General Stretton, then Director of the Natural Disasters Organization, moved in to head the emergency operations. An early decision was made to evacuate 35,000 of the city's 45,000 people, leaving a residual 10,000 to restore Darwin. Unprecedented in Australian civilian life, this mass evacuation entailed a massive airlift of 25,000 people within a week, with another 10,000 moving away from Darwin by road. Suddenly all states of Australia were involved, becoming host centres for evacuees.

The film mentioned earlier — *'When will the Birds Return'* skilfully depicts the evacuation of the sick, aged, women and children, the separation of families, the transfer to other states of indigenous people who had lived all their lives in the Northern Territory. It was a time of severe social trauma, of uncertainty. It was a time when a well-organized welfare framework would have facilitated the pooling and sharing of community resources to help cyclone victims with emotional support, counselling, information, and financial and material help. What was needed was a crisis intervention unit, manned by competent welfare personnel to help alleviate social dislocations of an order of magnitude not previously experienced after a natural disaster in Australia.

Roger Wettenhall, then Senior Psychologist with the Department of Health in Darwin, referred to Tracy as "Australia's greatest peacetime emotional crisis", and observed that "it had passed by without even preliminary recognition that it was indeed an emotional as well as physical crisis".

I recall two particular types of stress suffered by Darwin evacuees in Townsville, the one psychological, the other financial.

In the post impact phase of Tracy, over fifty psycho-geriatric patients were transferred from Darwin to Townsville. It became my responsibility, as senior social worker at the Townsville General Hospital, to effect long-term social planning for these patients who were airlifted into Townsville with little more than their names. A number of the patients were tribal aborigines, two of whom became critically ill. It was observed that the group developed a marked apprehensiveness which was eventually traced to unexpressed fears on their part that all might die in Queensland, and that their bodies might not be returned to the Northern Territory for burial.

This deep fear on the part of indigenes of being alienated from their own spirit world, and their need to be buried among their own people, illustrate one of the negative features of involuntary evacuation. It also illustrates the advisability, in our multi-cultural society for incorporating into pre-disaster planning behavioural scientists, such as anthropologists, who have specialised knowledge of the values and belief systems of ethnic groups in our communities.

A second group of Darwin evacuees who suffered unnecessary hardships were those who left Darwin by road and, in transit south, presented for help in Townsville, at the welfare unit set up in the Town Hall under the direction of a social worker from the Department of Social Security. These transients were exhausted families who had been

travelling over bad roads for days, many driving damaged cars, wearing the clothes they had left Darwin in, without cash reserves, and in obvious need of financial and material help. The contingent comprised anxious people, nursing mothers, unsettled children.

Their most apparent need was sufficient finance to meet the uncertain costs of travel. In Townsville, where large sums of money had been generously donated by local people to help cyclone Tracy victims, none of these funds were released to help them. The anomolous situation was that appeal moneys were being collected in Townsville and despatched intact to the state capital for transfer to Darwin, a city cleared of three-quarters of its population.

In this paradoxical situation, there are latent unresolved issues in counter-disaster programmes – the flexible use of appeal funds, disbursement on the basis of recognized welfare principles (help at the time and point of greatest need), and administrative accountability to both contributing and 'consumer' communities.

The Darwin catastrophe jolted the Australian states into re-thinking their preparedness for natural disaster. All the Australian states had, overnight, become emergency receiving areas for Tracy victims, with literally thousands of Darwinians being re-located in southern states. Their newly perceived relationship with a major civilian crisis, occurring in a remote part of the continent, prompted the calling of a historical meeting of State Welfare Departments to consider major counter-disaster issues – mass evacuation, mass feeding, accommodation, and the adequacy of communication networks.

The historical development of appropriate and increasing state government response to disaster-affected communities has been noted by Ann Quinnell in her paper

Following the Toowoomba Hailstorm, 1976, the Queensland Government established a Hailstorm Recovery Unit to carry out a series of welfare functions, and to gather information on the nature and extent of the disaster — a recognition of the dual aspect of welfare programmes in (a) providing a range of helping services and (b) the application of scientific method to developing a body of knowledge for disaster management.

Again, in 1977, during the Ingham floods, the Queensland Government seconded one of its Townsville-based social workers to assess the Ingham community's welfare situation: an official acknowledgment of government responsibility, and readiness to provide specialised welfare skills in the social rehabilitation of a community in crisis.

Of this breakthrough of social workers into community crisis intervention, Roger Wettenhall had this to say: "A direct line of vigour can be traced (drawn by the continuing interest and involvement of the social work profession) from one of the emergent Tasmanian groups — the Fire Victims Welfare Organization, through the Queensland Disaster Welfare Committee, to the Darwin Disaster Welfare Council.".

Within the space of three years, between the Darwin cyclone and the Ingham floods, the specific roles of social and welfare workers in disaster work had received government recognition.

The brief history of progressive welfare intervention into natural disaster offers mounting evidence of the legitimate role of the social worker in community problem-solving. In his Report to the Habitat Conference in Canada, 1976, Roger Wettenhall argues for "the integrating of the immediate rescue and order-restoring functions of the Natural Disasters Organizations and the State Emergency Services with the emotionally supportive and community-involving functions of the social worker". When he comments that "it is still true that the role of the social worker in disaster has been treated with utter inadequacy in our disaster planning", he is recognizing the fact that in this era of specialization, there are specialists in welfare: these are the social workers and welfare officers whose orientation is towards improving community life through intervention into socially non-functional or dysfunctional human situations.

In the general heightening of community awareness in the field of disaster, welfare personnel have a responsible set of tasks:-

the task of advocacy for vulnerable members of the community;

the task of enablers in educing self-help mechanisms in individuals and group disaster victims;

the task of brokers in their transmission of knowledge of, and accessibility to community resources;

the task of facilitators in promoting communication and co-operation between those who are directly involved in human service operations.

It is in extremities that the internal strengths of individuals and communities are tested to the full. To date, the testings imposed by natural disasters in Australia have registered little community response until the moment of impact. The sense of corporate allegiance appears to need a crisis and sense of urgency for its latent energies to be activated. This accounts for the manifestation of the *'convergence syndrome'* — the spontaneous response of people *after* a calamity, who are likely to find their offers rejected by preoccupied welfare teams. Counter-disaster welfare planners and administrators need to take cognizance of the untapped reservoirs of human energy within a given community, and of the necessity for implementing processes for locating, classifying, and marshalling this potential energy as a pre-crisis welfare task.

Self-help, a basic principle in welfare philosophy, has relevance for social rehabilitation following disaster: it was a principle enunciated by Major-General Stretton in activating community recovery processes in Darwin in the post-impact phase of cyclone Tracy. There is resilience in a community, and a latent capability for self-restoration through the efforts of its members. D.L. Webber, Senior Psychologist with the Department of Health in Darwin commented: "the lesson to be learned from the Darwin disaster is that internal resources of a physical, social and psychological nature must be utilized by communities in crisis". This is the theory of the therapeutic community writ large.

In community disasters, autonomous action by individual organizations is counter-productive to an overall community effort. Each organization doing its own thing is no guarantee that the community as a whole will benefit. In actual fact, individual and neighbourhood needs are likely to miss out, while others may be over-serviced. If disaster experience has taught any basic lesson in re-structuring delivery of welfare services, it is that pre-programmed co-ordination by the welfare bodies is central to effective community coverage.

Slowly, the rugged individualism of house-proud organizations is being modified towards concerted interagency and longterm preplanning against extraordinary community contingencies.

A community organization which has both structure and mechanisms for promoting community well-being is a locally constituted Welfare Council, which draws its membership from statutory, voluntary, and emergency bodies. Back of each delegate is an organization with a network of skills, resources, and services, all of which can be called into action when needed. These are welfare energy systems, capable of meshing into an overall design for community service in both normal and abnormal periods.

Such a co-ordinating body is in a position to offer specialised services within the State Counter Disaster Organization in the immediate post-impact phase, in the State Emergency Services in the intermediate phase, and in the local authority in the longterm aspects of community rehabilitation. Through welfare co-ordinators appointed by a Welfare Council, a natural linkage can be achieved within the emergency operations. Physical space within the emergency centre could be allocated to the welfare co-ordinator whose role is to actualize welfare input into counter-disaster activities, and to provide feedback on the community situation to counter-disaster planners and decision-makers.

Each local authority in Queensland has a major strategic role in any disaster affecting its area. From the moment a state of emergency is declared, the local authority is fully involved. After the state of emergency has been lifted, the responsibility for restoration automatically passes over to the local council: this phase represents the longterm reinstatement of the community.

Because a total effort will require the co-operation of the human service organizations within a local authority, councils are well advised to keep themselves informed about the array of welfare bodies which provide humanitarian services to the people within its jurisdiction. The need for a liaison between these service organizations and the local council has been recognized by the appointment of a new type of municipal officer — a social worker, alternatively designated as social planner or community development officer. The tasks of this municipal officer include advising council on community welfare matters, monitoring community needs in both normal and emergent periods, and identifying the actual and potential welfare resources which exist within the community.

A review of extant literature in Australia dealing with the psycho-social aspect of natural disaster establishes the fact that little has been recorded, even less has been researched. To date, there has been no serious evaluation of counter-disaster policies and emergency welfare delivery systems, no attempt to formulate a vigorous welfare planning and research component to address the basic human issues in natural disaster.

There are conspicuous gaps awaiting investigation: to name but a few — the nature and duration of psychological stress; formulae for pre-disaster and counter disaster welfare programmes; assessment of policies of mass evacuation; the socio-economics of disaster (including the financial capacity to recover from a major disaster, insurance coverage for people on low and fixed incomes in disaster-prone areas, the efficiency and accountability of modes of disbursement of disaster public appeal funds).

Natural disaster is being seen more clearly as an arena for the application of the specific knowledge and skills of behavioural scientists — viz., the dynamics of human behaviour; human tolerance to stress, and response to crisis intervention; behavioural implications of human settings; adaptation of human community to sudden disaster in a cross-cultural context; adaptation in new environments; the nature of social networks; the availability and adequacy of community resources; skills in interpersonal and group counselling; principles of social planning, social research skills. A characteristic feature of this focus is an emphasis on environmental perceptions and cognition, a heretofore neglected area of natural disaster research.

Armed with the tools and techniques of social research, behavioural scientists are now available and geared to scan past and present community responses, and to design efficient intervention methods to deal with a community in crisis. Behavioural scientists, moving into this sphere of study, have as models the substantial and impressive research which has already been done in the last decade, and is continuing, through the efforts of the physical scientists — preponderantly engineers, geographers and physicists. Significant data has emerged from these studies, much of direct relevance to community well-being, viz., the nature of cyclonic surges and the high risk to communities in low-lying coastal areas of North Queensland. This secondary hazard poses unaddressed questions relating to the welfare of the larger population centres along the coast of North Australia: the logical sequence to the now established surge areas is the application of behaviourally scientific methods to the study of the communities at risk.

Social researches could profitably identify with the systems approach of engineering investigations into disaster, and could take their cues from the enviable record of their physical sciences colleagues in securing financial support for their elaborate cyclone-testing models. It is manifestly clear that bold, persuasive and imaginative approaches to the funding bodies are necessary for those social research centres which have the public responsibility as well as the capability of mounting community-oriented studies into natural disaster.

There are hopeful stirrings, at many levels, of a community awakening to the exigencies of natural disaster. The National Emergency Services College in Macedon, Victoria, provides ongoing counter-disaster education. There are periodic conferences organized by the Natural Disasters Organizations. Seminars and community workshops are being organized regionally. State governments and local authorities are moving into more concerted planning. Queensland has its comprehensive network of State Emergency Service disaster districts, with operations officers working fulltime to alert and prepare communities to cope with disaster.

It is of consequence to the Australian continent, with its dispersed centres of population potentially under threat from climatic extremes, to have a specialised body on natural disaster with consultative status to the Australian Government, and empowered with the necessary funding to draw on scientific-technical, educational, and community expertise and resources, and to authorize ongoing research into the largely unexplored areas of effective community controls and management of natural disaster.

Whatever is being planned by officially constituted counter-disaster systems, the challenge remains for any given community which is subject to climatic vicissitudes to share in a common task of informing, preparing, bracing and organising itself to cope with disaster, secure in the knowledge that it will have, when needed, access to the greater sources of manpower, materials and money within the Australian andState Government.

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CYCLONE TRACY : PSYCHOLOGICAL AND SOCIAL CONSEQUENCES

Gordon Milne

Shortly after Cyclone Tracy, the University of Queensland's Departments of Sociology and Social Work were funded to the extent of $30,000 by the Whitlam Government to carry out a social survey of the disaster.

Two broad areas were to be covered: firstly, the organizational aspects — those included the pre-disaster preparations and warning systems, and the services provided by the authorities during the post-cyclone emergency and rehabilitation stages; the second important area investigated was the psychological and social consequences of the actual disaster impact and the evacuation which followed.

My concern was with the latter aspect of the survey — the psychological and social consequences of the Darwin disaster.

In studying the effects of a sudden natural disaster on a community it is necessary to distinguish between the *primary effects* — those which are inflicted during the disaster strike — and those which occur later, the *secondary effects*, which develop in the aftermath.

The *primary disaster impact* of a cyclone like Tracy results in physical injuries, psychological stress (mainly from the threat to survival of self and loved ones), loss of possessions, and damage to dwelling. These all occur while the cyclone is in progress.

Table 1. Percentages in each group who experienced high and low primary impact from Cyclone Tracy.

	Stayers	Returned Evacuees	Non-Returned Evacuees
	%	%	%
Low Impact	64	47	34
High Impact	36	53	66
	n	n	n
Group Totals	90	107	219

The first table compares the numbers suffering high and low primary disaster impact in each of three groups: those who remained in Darwin; those who were evacuated and returned; and those who were evacuated and had not returned when the study was undertaken, from seven to ten months after the disaster.

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We wanted to know, firstly, how these three groups fared in relation to one another during the disaster; and secondly, how they were affected by the secondary effects of the disaster, those which developed in the aftermath.

As you can see from **Table 1**, the Stayers were affected least of all by the primary effects of the cyclone, and the Non-Returned Evacuees were affected most. The Returned Evacuees were in between. You can see from the percentages how the trends are reversed when the Stayers and Non-Returned Evacuees are compared. We will now concentrate mainly on the secondary effects, those noted in the cyclone's aftermath.

Table 2. Percentages of injuries, sicknesses, and emotional complaints

	Males			Females			Grand Total
	Stayers	Returned Evacuees	Non-Returned Evacuees	Stayers	Returned Evacuees	Non-Returned Evacuees	
Group Totals	77	95	202	75	104	203	756
	%	%	%	%	%	%	%
Injuries	0	2	7	1	4	9	5
Diseases and Infections	7	3	4	4	5	3	4
Emotional Disorders	13	11	18	11	13	32	19

The second table summarizes the emotional and physical disorders of adults. 416 householders were interviewed, and data was obtained which related to spouses also, including de facto partners, thus bringing the full total to 756.

Injuries and illnesses were those whose effects persisted and were serious enough to be memorable. Emotional disorders included anxiety and depressive states, fear of wind, sleeping difficulties, excessive drinking, and hysterical and aggressive outbursts. As can be seen from the Grand Total (GT) column on the extreme right, the total incidence of injuries was 5% and of diseases and infections 4%. The total incidence for emotional disorders was much larger, 19%. Notice also that emotional disturbances proved more intractable.

Comparing the three groups, the outstanding feature is the large number of women in the Non-Returned Evacuee sample — 32% almost one third. As you can see, males among the three groups tended to suffer less than females, especially in the case of the Non-Returned Evacuees. Generally, it can be said that the incidences of injuries and emotional disorders whose effects carried over into the post-cyclone period were highest among the Non-Returned Evacuees.

Table 3. "Has any good come out of Tracy?"

	Stayers	Returned Evacuees	Non-returned Evacuees	Grand Total
	%	%	%	%
Yes	60	50	38	46
No	39	47	57	51
No Response	1	3	5	4
Total Numbers Responding	n 90	n 107	n 219	n 416

Now let us look at the third table. One of the questionnaire items, which was asked with some diffidence, went as follows:

"People say, 'It is an ill wind that blows no good.'

Has any good come out of Cyclone Tracy?"

Hardly anyone objected to the question. As you can see from the *"No Response"* line, only 4% declined to answer. The outstanding feature of this table, however, is that 46% of the Darwin cyclone victims were able to respond to this item optimistically (end of first line). The fact that they did so, and even claimed on occasions that they were better and stronger people than before, speaks volumes for the resources of the human spirit.

However, when results for the groups are compared, it becomes apparent that the more sanguine expressions relating to Tracy's aftermath emanated from those who stayed in Darwin, and to a lesser degree from those who had been evacuated and returned. The majority of the Non-Returned Evacuees were opposed to the suggestion that any good could have come out of Cyclone Tracy.

Table 4. Percentages of behaviour disturbances at different developmental levels.

Type of Behaviour	Pre-School	Primary	Secondary	Post-School	Grand Total
	%	%	%	%	%
Fearful					
Rain and wind	31	29	17	8	26
The dark	13	16	5	2	12
Jet aircraft noise	16	11	4	4	11
Regressive					
Clinging to mother	15	6	6	2	9
Bed-wetting	10	6	2	2	7
Thumb sucking	2	2	1	0	2
Aggressive					
Temper tantrums	6	4	4	0	5
Fighting, biting, kicking	6	3	1	0	4
Deliberately breaking things	5	2	0	0	3
GROUP TOTALS	n 257	n 236	n 103	n 53	n 649

Table 4 refers to the incidence of behaviour disturbances among 649 children at different developmental levels. The evidence here is very clear-cut — a negative association between the various behaviour disturbances and the ages of the children. The pre-school children were obviously most vulnerable, the primary school children rather less susceptible, and the secondary school children much less so. There are relatively few post-school "children", many of whom would, of course, be young adults.

Let us look at the Grand Total column in relation to the various kinds of childish behaviour disturbances. Notice that more than one quarter of all the children (26%) experienced post-cyclone fears of rain and wind. The first three items are conditioned fears or phobic reactions which account for the great majority of disturbed behaviours among the children. The remaining six regressive and aggressive disorders have much smaller incidences; fortunately, no doubt, because these would tend to be much more distressing in the overall family setting.

Table 5. Percentages of children's emotional disorders for three groups.

Type of Behaviour	Stayers %	Returned Evacuees %	Non-Returned Evacuees %
Fearful			
Rain and wind	20	24	29
The dark	11	13	12
Jet aircraft noise	5	8	16
Regressive			
Clinging to mother	6	5	13
Bed-wetting	3	7	8
Thumb sucking	0	2	2
Aggressive			
Temper tantrums	3	1	7
Fighting, biting, kicking	9	3	5
Deliberately breaking things	3	1	3
GROUP TOTALS	n 111	n 190	n 348

Table 5 summarizes the incidence of children's emotional and physical disorders for the three groups. As you can see the trend is the same as for the adult groups, the higher percentages occurring among the Non-Returned Evacuees. It should be mentioned in passing that there were no differences between boys and girls with respect to any of these disturbances.

Table 6. Percentages of parents reporting problems of children's schooling.

	Stayers %	Returned Evacuees %	Non-Returned Evacuees %
No problems	94	88	63
Some problems	6	10	24
Many problems	0	1	14
GROUP TOTALS	n 50	n 77	n 140

Next we come to the incidence of parents reporting school problems among the three groups (see **Table 6**). As was anticipated, the problems of children's schooling were largely a function of the need to change schools, which applied especially among the Non-Returned Evacuees. Within this group, 38% of parents reported "some problems" or "many problems" compared with 6% and 11% for the Stayers and Returned Evacuees. Since the large majority of parents (76.0%) did not report any school problems, the disproportionate contribution of the Non-Returned Evacuees is made explicit.

Finally, **Table 7** gives the results of a Before and Now Disaster Checklist (BNDC) which was administered to the three groups. Each respondent compared the extent to which he was "a restless person", "a smoker", "prone to headaches", etc., before Tracy with his

status in this regard at the time of being interviewed. *Before – Now* differences were treated so as to result in weighted difference percentages for each group in each item. These results indicate much greater post-cyclone maladaptation, especially, among the Non-Returned Evacuees.

Table 7. Responses to BNDC Items: Sums of Weighted Differences expressed as percentages of each Group.

	Stayers	Returned Evacuees	Non-Returned Evacuees
Maladaptation			
A restless person	19.1	28.3	57.9
Worried about the future	35.9	50.0	84.7
Nervous and depressed	25.0	36.5	55.3
Lacking in confidence	2.2	1.9	31.9
Short tempered	16.9	17.0	35.0
Addictiveness			
A smoker	4.5	5.7	7.4
Fond of alcoholic beverages	3.4	4.8	7.5
Taking pain killing drugs	5.6	0.0	10.2
Using sedatives	0.0	3.8	16.9
Psychosomatic Distrubance			
Prone to headaches	7.9	13.5	23.3
Troubled by a skin complaint	1.1	3.8	11.2
Lacking in energy	18.4	7.8	36.0
Without appetite for food	-1.0	6.6	4.6
Troubled by indigestion	11.4	0.9	8.4
Overweight	5.7	6.6	15.0
Asthamatic	0.0	1.9	2.3
Having bowel trouble	6.7	-0.9	6.5
Underweight	1.1	4.7	2.8
Family Stress			
Finding the children difficult	0.0	21.9	33.8
Worried about my marriage	-10.7	22.5	2.2
Taking it out on the children	1.9	10.9	30.7

Note: The weighted difference percentages (indices) are generally two to three times the simple percentage differences for the "not at all" category. One of the outstanding exceptions, "worried about my marriage", indicates how misleading the "not at all" percentage differences can be in isolation (with zero difference for the Stayers). Weights were allotted as follows: Not at all = 0; Somewhat = 1; Moderately so = 2; Very much so = 3.

Perhaps the most interesting result in the table is the response to "worried about my marriage". The negative index in the case of the Stayers actually suggests *improved* martial relationships following the cyclone.

There is little doubt that a large number of those who were evacuated by air, or who quickly drove themselves out and did not return, were those who suffered most in terms of

psycho-social stress. They also suffered most economically, though the evidence here is not clear-cut. There were ruined businesses and lower wages for many of the evacuees, but living was cheaper in southern capitals than in Darwin, and they were better housed than the Stayers. More important was the depression of mood and the lower morale of a large number of those who could not return. Much of this can be explained by the fact that the Non-Returned Evacuees suffered most during the actual disaster strike, the primary impact, and many left for this very reason.

However, having studied the evidence, it is my conviction that the total traumatic effect on the Non-Returned Evacuees was the resultant of two sets of factors: the primary impact, and the alienation from the social and physical environment to which they had become adapted. I also believe that what the Stayers *gained*, and what the Non-Returneds *missed*, was the *therapeutic effect* of being inside the post-disaster community.

The American sociologist, Charles Fritz,[1] described the psycho-social dynamics of a disaster-sticken community in the following terms: In the post-disaster community primary group life is strengthened. Social networks within families and among friends and neighbours are enhanced immeasurably as the community contracts itself into a simpler, more pristine form of life.

The more complex, culturally defined class, religious, and political roles, and even the more sophisticated aspects of sex roles, are diminished, at the same time as primary group life is strengthened. It is this primitivization of group organization which enables the community of sufferers to survive and to succeed in restoring and regenerating more complex forms of social life. Fritz called this phenomenon in post-disaster living the "therapeutic community".

Nobody could be in Darwin during the period following Cyclone Tracy, listening to people with high morale continually ventilating their shared experiences, without realising how valid this notion of the therapeutic post-disaster community is.

Nevertheless, it would be most unrealistic to pretend that in a disaster of the magnitude of Cyclone Tracy a very large proportion of the population need not be evacuated. It is necessary to admit this without losing sight of the proposition that the extent to which many of the disaster victims can cope and adapt, and maintain their morale, is a function of their ability to remain inside the impacted community and be subject to its therapeutic forces.

One is reminded of the problem which confronted the authorities in England early in World War II when it was decided to evacuate children to the country. Children who remained with their families in familiar surroundings withstood the effects of bombings surprisingly well — much better than those who were evacuated to strange foster homes withstood the effects of separation anxiety. Some of the very young children among the latter did, in fact, suffer permanent psychological damage[2]. (Fortunately, most of the evacuated Darwin children were accompanied by their mothers, though the separation anxiety which resulted from families being split up was one of the less happy aspects of the Darwin evacuation.)

When a great natural disaster calls for a city's partial evacuation there will always be many who have no choice but to leave, and many more who will leave by choice, and (probably) many, many more who will choose to stay. Only if there is very strong, objective evidence that the retention of would-be stayers could result in a second man-made disaster should intense moral suasion be applied to those reluctant to leave.

In conclusion, I want to say a few words about mental reactions to disaster exposure, and the need for emergency therapeutic intervention. We have seen how, in the Darwin disaster, there were far more who suffered emotional disturbances which persisted than suffered noteworthy illnesses and injuries.

In the U.S. there is a good deal of debate going on about how people react to disaster exposure. The sociologists (e.g. at the Ohio State Disaster Centre) always stress the adaptive mechanisms which enable people to recover their psychological equilibrium fairly quickly, and even to benefit from their profound experiences.

This is the view exemplified in the notion of the therapeutic community. It did happen in Darwin; consider the positive responses to the question, "Did any good come out of Cyclone Tracy?". It is also true that a number of shaky marriages were consolidated among the Darwin Stayers.

However, there is another view which is taken by the mental health professionals. These people point out realistically that traumatic neuroses *do* occur in the wake of disaster, and that active intervention is required immediately — a sort of mental first aid — to prevent permanent damage.

Now, I believe that both these viewpoints are valid and complementary. The vast majority of victims recover — and many even benefit in a deeply personal way — from a terrible disaster experience. But there are some — and we have seen how the frequency is likely to be higher among those who are removed from the community — who do suffer more or less serious maladaptation. I question whether very much is done for these people in the way of psycho-therapeutic intervention.

Physical first aid, and emergency surgical procedures, must always take precedence as life saving measures. However the neglect to provide, in addition, at the scene of large-scale disaster, teams of mental-health professionals, specially trained to provide mental first aid, is a serious deficiency. It certainly was the case at Darwin after Cyclone Tracy. It is a simple truism to point out that the time to tackle a traumatic neurosis is as soon as possible after the traumatic event.

We tend to forget all too quickly lessons learned from the institutionalized disaster of war. The classical reference in military psychology for the treatment of psychiatric casualties has been set out in a list of three principles[3] the importance of which was recognized as far back as World War I:

1. *The principle of proximity*, which states that the patient must be treated as near as possible to the place where he had his emotional breakdown.

2. *The principle of immediacy*, which views the treatment as a crisis intervention, to take place as soon as possible after breakdown.

3. *The principle of expectancy*, which states that the patient must expect, and be expected, to return to his former duty after a short period of self-organization.

With respect to the last of these three principles, a soldiers' identification with his unit will often given rise to irresistible pressure to rejoin it following evacuation. As one authority[4] has described it: "This (group identification) is a well-known phenomenon that develops among persons who have shared common hardships and dangers. It is a powerful and emotional bond, linking members of a combat unit . . . In some soldiers, group feeling is strong enough to cause them to leave the hospital prematurely and go AWOL to rejoin their units.

There is some evidence that in America, at any rate, the three pinciples cited above are being applied by leaders of community mental health programmes in the handling of situational emotional disturbances, those due to overwhelming environmental stress. If this is so there is good reason to hope that Australia will, in due course, be capable of setting up emergency community mental health centres at short notice wherever large-scale disaster strikes.

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PSYCHOSOCIAL STRESS AND NATURAL DISASTER

Danny McBride

My paper is organised in three parts:

1. Common behaviour and stress symptoms accompanying natural disasters.
2. Military research findings in the behaviour of men under stress.
3. Application of military findings to civilian situations.

Common Behaviour and Stress Symptoms Accompanying Disasters

Tyhurst, in the American Journal of Psychiatry in 1951 researched a particular American Disaster situation and produced some figures which, while they probably do not apply accurately to every situation, do indicate the possible dimensions of the problem. He found that in the large and representative sample of the impacted population studies:

10% panicked and were of little use in the danger situation.

70% were stunned by the effect of the disaster and were subject to what has been referred to as "psychic shock", and,

20% remained alert and useful.

A paper published in the Medical Journal of Australia (May 1975) describes in some detail the Disaster Syndrome (referred to above as psychic shock) in which the victim acts in a dazed apathetic manner often wandering aimlessly among the wreckage or sitting inactively. One small family found by Stretton many hours after Cyclone Tracy was still sitting in the place where they had sheltered at the height of the disaster. People in psychic shock are very much at risk during and immediately after the disaster impact.

There are other post-disaster symptoms. D.L. Weber the senior psychologist in the Darwin Department of Health wrote his findings: they are not quantified but they are the observations of a senior psychologist who was on the spot at the time of the disaster in Darwin. They are published in the Australian Journal of Social Issues in 1976. They reveal people who are in post-disaster shock, sometimes show themselves to be irritable and angry and very difficult to deal with. A certain amount of violence may be expected from this situation. There is loss of appetite, sleeplessness, particularly amongst children, and in the Darwin case there was a lot of stomach upset and diarrhoea amongst the people. Now this was not physical illness, this was a psychological thing. Nevertheless it is contagious, that other people, under the same sort of stress can start exhibiting the same sort of symptoms.

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In the Darwin situation, this had the effect that a rumour started to spread that cholera was about, and led to panic on the part of one group of people who commandeered a bus and tried to get themselves down to the airport for evacuation ahead of their turn. Scapegoating is also a very common behavioural manifestation where people are looking around for someone to blame. It is very hard to know who to blame for cyclones. One can always blame the Met. Bureau for not warning the people in time, or the SES for not coming quickly enough, and after every disaster there is a considerable amount of scapegoating at all levels. Some of it is constructive, but a lot of it is not constructive and really doesn't serve much purpose. Social workers may find to their surprise that their aid is not always gratefully accepted. In fact the recipients may even be quite aggressive, demanding more help than the helper is capable of giving.

Military Research Findings on the Behaviour of Men Under Stress.

War and battle are stressful. Battle tactics might even be described as attempts to control man-made disaster. The main aim is to produce disaster for the enemy and minimize one's own disaster effects. The greatest disaster comes about when soliders lose morale. Battles are lost when men become victims of psychological stress which accompanies combat.

So authorities at war for many centuries observed the behaviour of men under stress. There is a very large volume of Grinker and Spiegel, written in 1945, just at the end of the Second World War about men under stress, there is another one, a big multi-volume called I think, "The American Solider at War", written by Yerkes and Yokum, also published in 1945. Soldiers under war stress display the full range of reactive psychosomatic illnesses that civilians do when they are under stress.

In the early stages of the first and second world wars, as soon as people started showing the typical syndrome diarrhoea, headaches, nightmares, trembling, sweating, the fear syndrome, they were taken out of the front lines and sent home for hospitalisation. When this happened to them they never got back into the front lines again, and this is a tragedy because they also tended not to get better. Now, you say, they have got out of a nasty situation and are malingering and they are not going to get back again. This is a very unfortunate attitude to take because men who were not taken out of the battle situation, and were kept close to the war, got better and were able to return to combat again as no longer being psychological casualties. There are a number of reasons why this should happen and I think you should bear these in mind when you think of people being evacuated from the stress situation. The non-evacuated soldier is kept within his accustomed social network, he is in among the people he knows, who talk the way he talks, and understand what he is talking about, and who will not get sick and tired of hearing his stories about what happened to him in the war.

It is absolutely essential soldiers suffering from "shell-shock" or war-neurosis, be given the chance to ventilate their fears, to talk to people who know what they are talking about. There is no use telling a nurse about how you were in a trench and the guy beside you got blown to pieces, and how you had to wipe your best friend off your uniform before you went to Parade the next morning. The nurse is not going to understand that, and therefore is not going to give you the same sort of listening. People must be kept within their accustomed social network, they must be allowed to ventilate their experiences, to come to terms with them, they must be allowed to indulge in reality testing. If you have been in a trench where a lot of people have been killed, if you have been in a disaster situation, you get the impression that things are far worse than they really are. Unless you can come back and evaluate them, or you can have someone tell you the exact details of what happened, there is a sort of blank shock. It all seems so dreadful. If you have been involved in a car accident, the memory of the incident and the depression and sense of shock which accompanies it almost invariably decreases if you can go back and look at the wreckage and re-evaluate the incident in a less emotional frame of mind.

People must be given the opportunity for reality testing. To be allowed to get back to the situation, look at it and discuss it with other people who were there, ventilate their fears and come to terms with them. It is absolutely essential that if somebody has lost a relative, even if you know that relative is badly cut up, they be allowed to see the body if they wish to do so. Of course if they don't want to see it you must not force them, they must be allowed to see the body if they want to see it because they can then come to terms with the fact that the person really is dead. They can not come to terms with the fact that someone else says: "I found him and he is dead, you can take my word for it, don't look at the body it is not going to do you any good, remember him as he was when he was alive." People must be allowed to grieve, not only for the people they have lost but the things they have lost.

Now let us consider another piece of military research. The question was asked: "Why do some soldiers develop the typical basic psychosomatic combat stress syndrome while others do not?" The answer to this question would provide the key to the reduction of psychological casualties. However, detailed questioning of a large sample of soldiers revealed the surprising fact that nearly all of them developed at least some of the stress symptoms some of the time yet most did not report sick. When the symptoms were not reported they usually simply cleared up without treatment. Like the civilians, a proportion of the soldiers withstood the stress and remained efficient while others in the same situation became unfit for combat. Professor Beverley Raphael (Associate Professor Psychiatry, University of Sydney) at a Cyclone Seminar held at the Australian National University, October 1976 described the factor which keeps people psychologically intact under stress has much to do with personal training for disaster. The person who has overcome other stressful tests of personality integration, who has achieved a sense of confidence in his ability to cope with trouble, is much better fitted to remain useful in a community disaster. Professor Raphael calls this experience/training factor the "p-factor". Dr Boyle of the U.S. Army Human Resources Research Organisation researched the same problem and in the case of combat troops returning from Vietnam named the Factor "Confidence-in-Context". "There are no cowards" he said, "only people who lack confidence in the context in which they are serving." To remain psychologically fit the soldier must have confidence in his equipment, his training, his officers, his organization and the aim which the whole action is striving to achieve. Above all he must be confident that his personal actions are contributing realistically to the aim. It follows of course that the soldier must know what the aim is.

Now let us try and apply some of these things to a civilian disaster situation, to try to minimise, psycho-social stress. Civilians are not soldiers, they are not trained in the same way, they are not subject to the same discipline, however they are comparable in a great number of ways. They have their certain degree of trainability, they have their group situations, their social networks in which they can help and support one another. They have to be educated in advance and this is a big problem. If you overstress the dangers of cyclone to people, the danger of disaster, you bring about a very high level of anxiety in a large proportion of the population. When people get a high level of anxiety they start to erect fences against that anxiety, they use such defence mechanisms as "denial" — "it couldn't happen to me", "most cyclones veer off out to sea and do no damage", "cyclones only do damage once in 40 years", etc., etc. Or they may rationalize: "I'll drive inland to Charters Towers and escape any future cyclones". Unfortunately if people are not sufficiently pressurized to take action they again will do nothing to protect themselves or their property.

So authorities are on the horns of a dilemma, the best solution to which has to be a compromise: urge people to heed cyclone warnings but at the same time urging positive survival action rather than emphasising the dangers. At the same time, groups of people must be trained to organise the efforts of the hypothetical 70% who will require leadership. The State Emergency Service will obviously be the key emergency group but other social networks which comprise Red Cross, Salvation Army, Seventh Day Adventists etc., must be preserved and allowed to work within their pre-disaster organisations. Lifeline and Marriage Guidance can supply a body of trained counsellors whose role, I would assert, has been to a large extent overlooked by authorities planning for disaster minimization.

In the event of evacuation becoming necessary, Gordon Milne's research in the Darwin cyclone indicates strongly that families and neighbourhood communities should be preserved intact as far as is possible.

In the immediate post-impact phase of any disaster, communications become crucial for the psychological, as well as the organizational welfare of the community. Not only must people be quickly organized into constructive action but they must be kept informed of the "aim", the organizational plan, and the part which they themselves are playing in its fulfillment.

I finish with a quote from the paper by Gordon Milne: (Australian Psychologist, March, 1977). He studies people of Darwin who stayed on after the disaster, comparing them with those who were evacuated and did not return.

He says:

> "The extent to which disaster victims can cope and adapt may well be a function of their ability to remain inside the impacted community, be subject to its regenerative and integrative resources."

A TRAINING MODEL FOR DISASTER COUNSELLORS

Peter McDonald

Historically, politically, natural disasters have been viewed primarily as physical events. Only in the last few years has there been any recognition of the psychosocial stresses involved in such situations. Programmes and research dealing with psychological problems have been hampered and interfered with at both political and bureaucratic levels. Australia's record varies: the welfare services have generally recognized a need, but the emergency services, those in control in any disaster situation, are run on military lines by officers whose business is physical rescue. Making such a statement is not to denigrate the fine work these people do, indeed, to do so is to be naive. However there is a singular lack of interest of the psychological effects of a natural disaster on a population. Quite simply, a person affected by a disaster is processing information in a purely psychological manner. Reser (1978) calls it a 'psychological reality': even physical information and reactions are processed psychologically. Thus varying levels of ability to cope, personality variations, and a myriad of other factors will all affect the way in which the disaster is experienced.

This paper attempts to show that disasters are psychological events for those impacted, and that there are long-term consequences directly related to a disaster. Embedded within this statement is the suggestion that crisis counselling immediately post-impact can do much to circumvent a significant amount of long-term psychological disturbances. The latter part of the paper presents a general model for disaster counsellor training. How the model is used in particular situations largely rests on the style of the professional counsellor implementing the programme.

A disaster provides enormous stress, enough to overload any processing system, physical or psychological. The effects of such stress on humans has been the subject of some military research in the post World War 11 period, little however, being carried out on natural disasters. What has appeared presents fairly clear evidence of detrimental psychological sequelae. Conversely, a disaster or crisis is not necessarily dysfunctional for individuals or family units. Some react positively to such stress, and indeed, for them a natural disaster may contain the seeds to considerable personal growth. This group is noticeably small, usually consisting of emergency personnel, other helping professionals, and that group in society whose socialisation predisposes them to positive reactions.

Kinston and Rosser (1974) feel psychological help is needed in all phases of a disaster, but that such assistance is actively resisted in the initial post-impact stages by other helping personnel, and by the victims themselves in the later stages. They suggest there is confusion as to the priority to be assigned to psychological assistance. The Ancash earthquake recovery operations, they report, were hindered by psychiatric complications. There is a suggestion that at least 10% of a population may be so disturbed as to require specific interventions.

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This could vary from severe psychological disturbance to a need for information relating to material assistance.

American research suggests impacted groups not given opportunity to ventilate disturbed emotions appear to exhibit serious long-term effects. The Hurricane Agnes (1972) experience is a case in point. Heffron (1977) feels individual victims experience emotional crisis "which can lead to continued stress and potentially serious emotional problems if not resolved in a positive manner". Discussing the Agnes victims, Melick (1978) reports a significant difference between those affected and another flood-free group. When measured on the variables 'duration of illness' and 'self-perceived influence of the flood on their health', the former group appear to be seriously disadvantaged. However, the interesting factor in this study was the time lapse between disaster and measurement - nearly three years.

It is possible to identify two general types of reactions; those immediately post-impact, and those appearing in the recovery period. The post-impact period finds a small percentage effective, tense, excited, and too busy to worry. A large proportion are dazed, bewildered, and stunned. They will be most likely indecisive, lack responsiveness, and show some automatic behavioural manifestations of fear. Finally, there will be a small group who are likely to indulge in 'grossly inappropriate behaviours', hysterical reactions, anxiety, and some affective and psychotic states. Remember this is a generalized idea, in practice these percentages will vary with the population and the situation.

The recovery period usually finds the majority of the affected group moving to a slightly altered 'normality'. The community is then involved in permanent reconstruction, with modifications to morale, values and economy. What also appears is some grief, depression, and post-trauma disturbances. There is likely to be an increase in physical illnesses and death, and an upsurge in psychosomatic problems (Kinston & Rosser, 1974). Again these reactions should be placed in perspective. They will not involve large proportions of the community, but they are likely to form a significant percentage.

Attempts to combat disaster effects - the outreach programmes

There are very few reported instances of crisis outreach programmes in the disaster situation. Australia had a temporary unit operating in the Hobart bushfires of 1967 (Wettenhall, 1975). But this was very much an ad hoc attempt, albeit quite successful. Staffed primarily by social workers and other professional helpers, it seems to have circumvented much of the community confusion about material assistance, while doing some spontaneous counselling.

The second programme, Project Outreach, was created in response to the effects of Hurricane Agnes in Massachusetts, U.S.A., in June, 1972. It grew from the recognition by National Institute of Mental Health personnel that a short-term crisis intervention service was needed to complement the normal welfare agencies. Quoting from Heffron:

> Project Outreach was designed to provide mobile mental health services to disaster victims . . . . . The central purpose was to reach out to disaster victims by taking services directly to the client in an early direct intervention approach designed to prevent the development of long-term emotional disability.
>
> (page 104)

It is fairly clear from research in other areas that preventing the development of emotional disturbances is more socially and economically effective. It should be noted that the service envisaged is intended to complement existing welfare agencies by providing specialised assistance, hopefully facilitating their community restoration operations considerably.

The rest of this paper concentrates on the specific counselling philosophy related to disaster intervention, and delineates in a general manner some of the specific needs of the disaster situation.

A disaster counselling philosophy

There are a number of recommendations suggested by Heffron as specific to disasters, although they obviously appear in other counselling methods. Firstly, focussing on the problem and resolving the issues involved can be a very therapeutic technique in disaster related crises. Implicit in this is the need to help the victims ventilate their fellings. The usual avenues of relatives and friends are likely to be unavailable, as they may be in a similar position. Secondly, the crisis worker helps his client to maintain reality in what is an extremely stressful situation. There is no point in suggesting things will 'get better' if there is a good chance the problem may deteriorate. Thus the counsellor, by showing the victim how to handle the reality of the disaster, is being far more effective.

A further consideration or value is the recognition by the crisis team that their *outreach intervention* should be *aggressive* in its approach. Many people are unaware of the resources available to them. Reports from the aftermath of the 1974 Brisbane floods support this. Other groups, the elderly for example, motivated by feelings of self-reliance or independence will try to return to normality without outside help. These groups or individuals need to be reached and given every assistance as their ability to cope may have been drastically affected both by the massive environmental stress and from possible damage to possessions normally used for repair.

Fourthly, the intervention counsellors have to be sensitive to their own psychosocial needs and stresses when dealing with often frustrating and deteriorating conditions. Admittedly this is a danger in any therapeutic relationship. In the disaster context with constant contact with tragic reality, bureaucratic difficulties, and the knowledge that the intervention might not be successful, the crisis workers might themselves become psychological casualties. Operating in pairs does much to counteract this problem.

Finally, a crisis programme is best not identified with a psychiatric or psychological service, but rather as a general helping organization. There are strong social reactions to being involved with a 'psychologist' and the possibility of being laballed 'mentally ill'.

A general training model

At a general level there are a number of stages to the therapeutic relationship. Rapoport (1962) identified four:

(a) focussing explicitly on the crisis
(b) assisting the client to understand the crisis
(c) offering information concerning the crisis, using all available resources
(d) developing a bridge for the client to other community resources

These steps imply the ability to build and structure a relationship, to explore problems, formulate goals, plan strategies, explore emotions, and teach new coping skills.

Given these requirements, a major consideration is helping the trainees towards personal growth and awareness, supported by training in specific intervention techniques and exposure to disaster and crisis theory.

The most appropriate method of training seems to be didactic/experiential, with an emphasis on the latter. Project Outreach used a similar idea, backing up the training with regular inservice meetings.

There is no real advantage in describing detailed individual techniques as these tend to be highly personal, resting on one's ability to cope and on the level of personal awareness. What might suit one disaster counsellor would be inappropriate for another. Below, then, are listed several resource texts for trainee counsellors in the disaster context. They are aimed at a general counselling population, but if the considerations mentioned above

are noted, any technique can be adapted to local conditions by a competent, professional counsellor.

Barton, A.H.: *Communities in Disaster: a sociological analysis of collective stress situations.* New York: Anchor Books, 1970.
This is a good general introduction into the theory of disaster. Along with the Quarantelli text, the best available for providing counsellors some appreciation of the difficulties involved in the disaster context.

Brammer, L.M.: *The Helping Relationship: process and skills.* New Jersey: Prentice-Hall, 1973.
Small but clear section on crisis counselling. Specifies the microskills involved in the therapeutic relationship and provides a general introduction to counselling theory and practice.

Dynes, R.R.: *Organized Behaviour in Disasters.* Lexington, Massachusetts, 1970.
Another good theoretical text. More concerned with organizations, community and otherwise.

Egan, G.: *The Skilled Helper: a model for systematic helping and interpersonal relating.* California: Monterey, 1975.
Similar to Brammer, this has a companion volume of exercises suited to counselling training. A most useful book.

Hackney, H. & Nye, S.: *Counselling Strategies and Objectives.* New Jersey: Prentice-Hall, 1973.
Used with Brammer, a good source for a training programme. Largely consisting of exercises, it was written with the beginner in mind. The exercises can be easily adapted to suit a particular trainer.

Hammond, D.C., Hepworth, D.H., & Smith, V.G.: *Improving Therapeutic Communication.* London: Jossey-Bass, 1977.
A new text presenting theory and exercises for developing skills in perception, empathy, additive empathy, non-possessive warmth, authenticity, relational immediacy and confrontation.

Johnson, D.W.: *Reaching Out: interpersonal effectiveness and self-actualisation.* New Jersey: Prentice-Hall, 1972.
A most important source for training in personal growth and effectiveness as a counsellor. Used with the text below, it forms a powerful teaching tool in counselling.

Johnson, D.W., & Johnson, F.P.: *Joining Together: group theory and group skills.* New Jersey: Prentice-Hall, 1975.
Good source material for team-building and personal growth. Many exercises demonstrating specific skills and theoretical constructs.

Koberg, D., & Bagnall, J.: *The Universal Traveller: a soft-systems guide to creativity, problem solving and the process of reaching goals.* Los Altos, California: Kaufman, 1976.
A popular soft-cover manual with some useful exercises and suggestions for personal growth and awareness. Tends to concentrate on problem solving techniques.

McGee, R.K.: *Crisis Intervention in the Community.* Baltimore: University Park Press, 1974.
One of the most useful texts yet to appear in the area. Primarily aimed at suicide crises, McGee presents his ideas in such a way as to facilitate adaptation by other professionals. He was also responsible for the training of the Project Outreach disaster counsellors. Highly recommended.

Quarantelli, E.L. (editor): *Disasters: theory and research.* London: Sage, 1978.
Another sociological text, the latest yet available. A good source for disaster theory, and some of the related research.

Conclusion

In summary, then, the paper attempted to make two issues clear:

(a) disasters are primarily psychological, secondarily physical events.
(b) there are long-term consequences of disasters that could be circumvented by a crisis service.

An organized crisis intervention unit can only facilitate recovery operations. When psychological problems are solved or resolved at the 'grass roots', there is a large economic and social payoff, especially when seen in terms of work days lost through emotional disturbance, increased psychosomatic illnesses, accident rates, and so on. The general model outlined above uses standard counselling techniques adapted for the particular context of disasters. It would need to be controlled by a competent counsellor, who might be a social worker, psychologist, psychiatrist, clergyman, marriage guidance counsellor, or some other similarly trained person. Using such an intervention programme is economical and effective, as the American experience has demonstrated.

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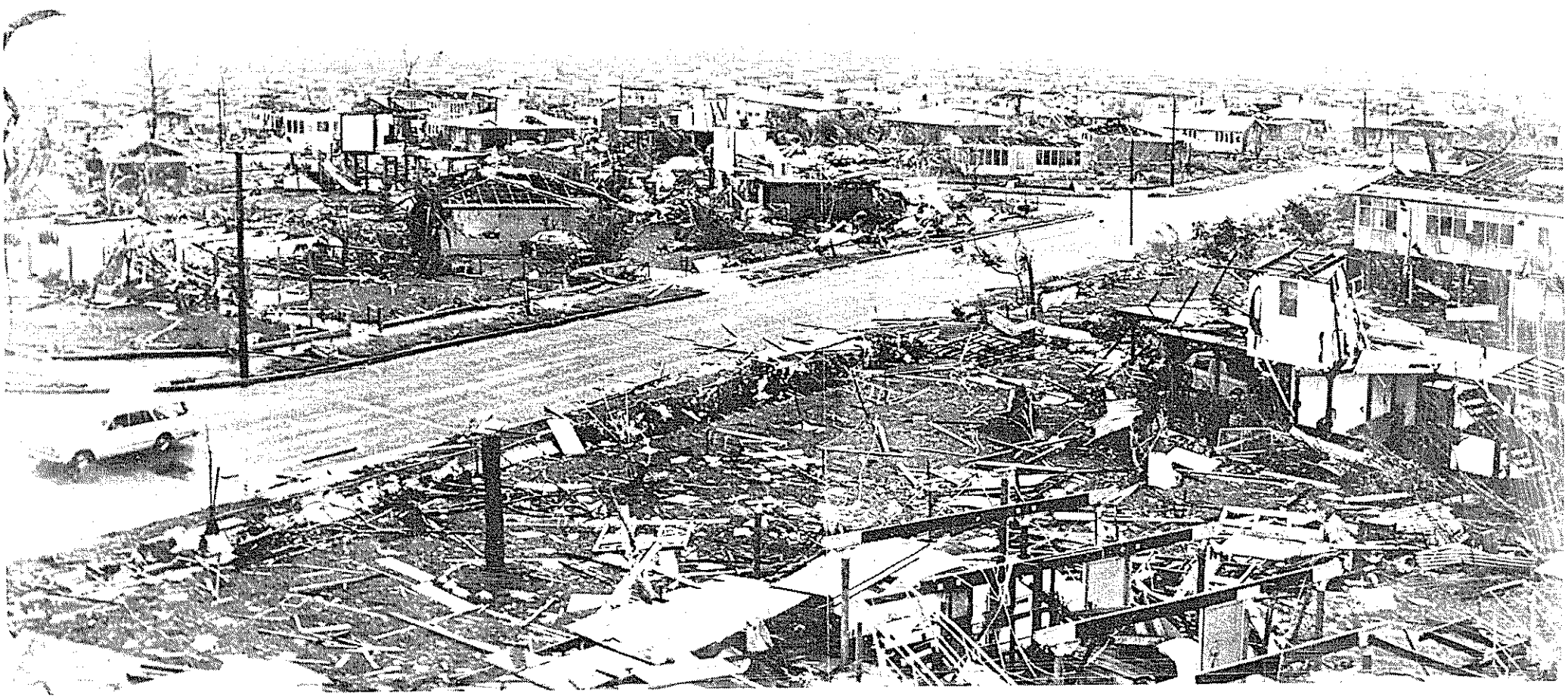
Aftermath of Cyclone Tracy, Darwin 1974

(Photo Courtesy of Herald and Weekly Times Melbourne).



DAY ONE IN DARWIN:
ONCE AGAIN THE VITAL ROLE OF COMMUNICATIONS

Joseph Scanlon

At 30 minutes past noon Darwin time on December 24, 1974, Christmas Eve the Tropical Cyclone Warning Centre at Darwin, Australia which had been monitoring Cyclone Tracy for several days issued a top priority flash:

> At 12 noon CST severe tropical cyclone Tracy was centered 110 km. WNW of Darwin and is now moving slowly SE closer to Darwin . . . Very destructive winds of 120 km/h with gusts to 150 km/h have been reported near the centre and are expected in the Darwin area tonight and tomorrow.

On Christmas Day, 1974, a cyclone called Tracy devastated the northern Australian city of Darwin, population 45,000. When the storm passed, it left most homes destroyed, the rest damaged.[1] All utilities — power, water, sewerage, telephones — were out.[2] Communications were in disarray. Sixty-five persons were dead[3] and at least 1,000 were injured. (Accurate figures were never calculated.[4])

The devastation was so severe that, during the next few days, most of the population was evacuated.[5] Control of the community — including the running of the evacuation — was given to an outsider, to the head of Australia's Natural Disasters Organization, Major-General Alan Stretton[6]. That decision was made by the Minister responsible for Darwin which is part of the Australia's federally-administered Northern Territory.

Stretton arrived in Darwin at 10.20p.m. Christmas night and his account of what happened from then on has been well documented in the press, in speeches, in reports and in his book, *The Furious Days*[7]. What has not been told so well is what happened in Darwin on Christmas Day after the storm had passed but *before* he took over. By implication — at lease from his account — it would appear not much was done. He states it was difficult to reconstruct events "until my arrival on Christmas day"[8].

This article takes up that implied challenge. On the basis of roughly 70 interviews in Darwin and elsewhere[9] (almost every key person was interviewed) it attempts the admittedly difficult task of reconstructing what actually *did* happen in those first few hours after the cyclone*. It concludes that, despite the destruction, quite a bit was accomplished. "Day One in Darwin" was most definitely not a model of administrative efficiency. But it was and is an excellent example of how a community can begin to recover from an incredible ordeal. It is also a classic illustration — perhaps the best since Halifax[10] — of the vital role of communications in society.

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*The author would like to thank the many people who helped his research. Every key person agreed to be interviewed, and talked freely about the experience of Tracy. More than half a dozen commented on the original paper and suggested corrections, revisions, and alterations.

The Plan

Darwin is no stranger to danger and disaster. During World War II it was bombed 59 times by the Japanese, the only Austraian city ever hit by a raid.[11]

During the wet season the year of Tracy, it had been regularly cut off except by air or sea. The Stuart Highway — the road link to Alice Springs and the South — was out for four to five weeks at a time. The rail service from Adelaide to Alice Springs didn't run for four to five months.[12]

Also, on at least 30 occasions in the last 150 years, cyclones have passed close to Darwin, three of them close enough to cause destruction, death or alarm[13]:

- on November 27, 1839, a cyclone nearly destroyed the settlement then known as Port Essington. That storm was accompanied by a tidal surge;
- on January 7, 1897, 28 lives were lost in a storm very like Tracy. Darwin, then called Palmerston, was almost completely destroyed; and,
- on March 10-11, 1937, a cyclone hit Darwin with hurricane force winds for several hours — with gusts up to 160 km/h (95m.p.h.). The city suffered heavy damage though just one person died.

Because of such problems, Darwin had a longtime emergency set-up. It was run by civil defence until 1972, by the police from 1972 to 1974, then just weeks before Tracy put under a civilian director of emergency services[14]. The decision to create that position had been made as a direct result of a report by a senior army officer. He had argued the police should be concerned with public peace, public order and public safety and should "not be burdened with the added responsibility of disaster co-ordination".

His report — adopted two weeks before Tracy — left emergency planning with an emergency committee under the direction of the administrator (Darwin is part of a federal territory), his deputy the permanent secretary, the director of emergency services and his two deputies for emergency services, one of them the commissioner of police.

The officer's report had also called for mobilization in the event of a disaster threat, for central control by a co-ordinating committee and for a special survey section to provide rapid information on conditions in the disaster zone[15]. It also saw a need for a food committee to stockpile food supplies (it was written just after the flood period) and that committee and some others were established.

The Reality

Cyclone Tracy exposed two main problems. The first was that before the storm the plan wasn't followed. The second was that — after the storm hit — none of the key people were readily available to make it work.

Stretton says, in his book, that, prior to Tracy, an emergency headquarters should have been manned, an emergency committee meeting called, emergency communications tested and other precautions taken. He says he could find little evidence the warnings — and there were very explicit warnings — were heeded[16].

He is mainly correct.

The Bureau of Metorology issued a stream of weather warnings and notified all key officials privately when it appeared certain Tracy would strike Darwin. From early afternoon on Christmas Eve — once the cyclone was headed directly at Darwin — the local ABC radio station broadcast a detailed weather warning stating a cyclone was imminent and telling people what to do to protect themselves. Everyone interviewed recalls hearing the warnings and talking about them at the many, many parties customary on Christmas Eve.[17]

But these warnings — in most cases — appeared to have had little effect.

The schools — designated as emergency centres — were not opened for use. The staff had left their office after a Christmas Eve party without making any arrangements for the keys to be available.

The director of emergency services did not — as the plan required — organize a meeting of the emergency committee. (Many people were away and others were at the customary Christmas Eve parties.) He did, however, order the emergency bunker manned and checked personally to see this was done (it was).[18] He also discussed the problem with some members of Darwin's Emergency Committee and with the duty officer of the Natural Disasters Organization in Canberra.

The police — who are supposed to take home special radios in a potential emergency — did not do so. There was also no attempt to put in or test station-to-station communications. However, the police did maintain an extra shift on duty and did lay out special equipment — including axes, picks, shovels, crowbars — so they would be prepared for problems after the storm. They also sheltered many people in the various police buildings including members of police families.

The hospital was best prepared of all. There, the staff taped windows to stop flying glass. Patients were moved to protected areas or — as the storm grew in intensity — under the beds[19]. The precautions proved successful: there were no storm injuries at the hospital[20]. The staff even managed to assist a lady deliver a baby as the eye of the storm passed over Darwin.[21]

Leadership

Once the storm had struck any further precautions were no longer possible — and the emergency plan was in severe difficulties. None of the four key people were immediately available to get it rolling.

- The administrator was home spending Christmas with his family in Alice Springs, still in the Northern Territory but 1353 kilometers from Darwin;
- The permanent secretary was in Darwin but he was trapped in the wreckage of his house. He was in shock and still cannot recall very much about Christmas Day.
- The director of emergency services was in Darwin but his home was wrecked and he spent the night worried about his daughter (a cupboard had collapsed on her);
- The senior police officer — the fourth man in the emergency hierarchy — survived the storm physically unscathed but had begun the morning chopping trees to free his automobile so he could drive to the police station.

Transportation

Missing leadership wasn't the only handicap. There were also very serious problems of moving about which made it difficult to get people together and difficult (because of equally severe communications problems) to gather any accurate information about the total effects of the storm. In fact, the destruction was so severe it was difficult, at times, for experienced drivers to figure out just where they were: Stretton's driver, for example, got lost en route from the airport Christmas night.[22]

Those who tried to ride or drive found the streets blocked with debris. When they tried to drive they usually got punctures. When they tried to move the debris they often cut their hands.

> . . . cut hands were a problem. When you were driving a car you had to get out and keep shifting debris. . .

this guy . . . he had my car . . . had 11 punctures the first day . . . the first mechanics we had we put them straight on changing tyres. . .

the idea was you drove for a few hundred yards and you got a flat tyre. . .

It normally took me 10 minutes to get from my home to the airport. That particular morning it took me an hour and twenty . . . the problem was getting around.

These difficulties led many — including the police — to scrounge what they could from any available source. Garages were entered and any available replacement tyres taken. And tyres weren't the only thing taken as needed. Petrol, too, was in short supply because the pumps weren't operating since there was no power.

. . . the problem of getting petrol because all the pumps were powered with electricity. We were milking cars. . . abandoned police cars with four flat tyres . . . they seemed to be everywhere. . .

Even those who tried to move about on foot found the going difficult and often dangerous.

Quite a number of additional injuries (mainly penetrating wounds of the feet) were incurred after the cyclone. . . .

There were thousands of people suffering with feet full of glass and very bad cuts.

As people started getting about there was glass and nails. The normal footwear of Darwin is the plastic thong which provided no protection.

The quick, accurate assessment of what had happened was not going to be done by persons moving either on foot or by vehicle. People sent on errands often disappeared for hours[23]. Vehicles broke down constantly as tyres simply gave out. Even after the roads were relatively clear one man reported taking 90 minutes to go 10 miles.

Internal Communications

Before it passed by, Tracy also knocked out Darwin's various local communications systems.

The telephone system survived most of the night but by dawn it was gone. Rain had entered through apertures in the roof and had soaked the switching equipment and stand-by power units in the exhange.

The police and ambulance radios were both off the air. The wind had blown down the aerials. The key agencies — police, fire, hospital, ambulance, the various utilities — could not communicate with each other. The wind, in fact, was so severe the police had to abandon their communications centre between 3a.m. and 4.30a.m. The phone was still working but it was dangerous to stay and answer it. (Later, the phone was answered from beneath a table.)

The mass media were also gone. Although the television line coming in from Mount Isa was still functional, television was not working in Darwin itself. And local radio was off the air. Even the emergency radio system had been downed by the storm.[24] (The emergency bunker had also been flooded: those who manned it were forced to leave.) The newspaper, however, did bring out a mimeographed edition on Christmas Day (using power at the police department).[25]

Even hand held radios were, initially, of limited use: vehicles could not move and radio communications with abandoned or stuck vehicles would have yielded only scattered information. The best information systems was a courier system involving hand delivery of messages by police and civilian motorcyclists.

We didn't have any communications. That was our problem. . . We had no power. The emergency generator wouldn't start. We went and stayed in the car. Afterwards all communications went and we noticed the aerial was down as well. . .

The next thing we discovered was that all the automatic fire alarms were working. Bells were ringing furiously everywhere. It was running our batteries down. We'd lost all communications.

There were initially no communications. . . and we had no idea of the prospective work load. . .

You don't realize what it is like without communications. It becomes apparent that only by going round and round the bloody circuit was anything going to get started at all . . .

There is no water, no power, no communications, no word from the outside world. For forty-eight hours, no local radio station functioned. People wandered about disconsolately asking, 'if only they would *tell* us something'. "They" the local authorities are as confused and as paralyzed as the average folks[26].

Then the terrible realization came that all forms of communcation in Darwin had been destroyed. There was no way of knowing whether the rest of Australia knew that Darwin had been destroyed . . . the anxiety of not being able to let relatives and friends know if you are alive and well and safe . . .

Even if there had been a surviving emergency radio system it would have been hard to inform the public what was going on. For one thing, no one knew: it was not possible to get an accurate assessment of what had happened. For another, the public had no means to receive such information. There was no power for plug-in receivers and most transistors were damaged or water-logged[27].

As it was, those who had radios that could operate found the absence of news alarming:

About one a.m. we lost all radio contact. In the morning we turned on the radio. It was just silence . . . eerie. I tried the telephone. It was dead. There was no way you could communicate. The silence was a sense of loneliness.

(One reason for the silence was that fowl and insect life had been destroyed.)[28]

During the silent period as the eye of the storm passed over one man had flashed his light: he hoped someone would respond. Another man who had slept through the storm woke up to find the floor above his apartment gone. "When I looked out the window," he said, "I thought I was the only person left on earth." It was a feeling widely shared.

Loneliness took two forms: it meant, at first, you did not know if you, alone were being chosen for disaster; it meant later you wondered whether you and those who had survived with you were isolated from the world outside.

And the day — Christmas Day — made this even more real. Christmas Day is a holiday in Australia — sometimes the messages to the outside went nowhere because there was no one at work at the other end to receive them.

Other Problems

Aside from the problems of leadership, transportation and communications, Darwin had to deal with many other difficulties.

There was the lack of water. Darwin is in the tropics. People quickly become thirsty, sweaty and dirty.

There was the problem of food. Much of it was lying loose, some of it in battered freezers. With the warm, humid weather it would soon begin to rot.

There were pets on the loose. Some animals were running wild. Others were likely to get into the abandoned and decaying food. (Eventually, many were shot.)

There was the problem of the dead. Bodies would decay very rapidly in the tropics. Without power there was no appropriate place to serve as a morgue.

There was the problem of the injured. It now appears thousands had been injured. Without communication or transportation that could not be known.[29] But there were, in fact, injured people scattered throughout the entire city. (It was also possible others were trapped in the wreckage.)

And there was the general state of shock created by the night of noise and terror (cyclone winds are very, very noisy): many people were stunned by what they had experienced.

> The roar (was like) a Vulcan jet bomber flying permanently overhead with the throttle wide open. . .
>
> awoke to hear a siren of somebody with his hand pressing continually on a horn button . . . the siren noise grew in intensity and just before the blast hit the house with redoubled ferocity, (I) realized it was the wind on its way back . . .[30]
>
> All of them were stunned. Everyone was like a lot of zombies . . . There were a lot of people wandering about aimlessly.
>
> Its howl approached across the harbour . . . this is surely one of the most frightening sounds on earth . . .[31]
>
> The desolation was overwhelming . . . I could see the people wandering about almost in a stunned way . . . It was evident no one knew what to do and that people were in a state of shock. . .

There were also rumours, rumours Tracy might turn about and come back again.[32]

> One rumour was the cyclone was coming back. . .
>
> People believed a cyclone could easily turn around and come back again . . . The fear of having the thing come back again was almost paralyzing . . .
>
> The great worry was the cyclone was going to turn around . . .

The fact is there was no such danger. The meterological authorities are absolutely certain on this point. The problem was that without communication it was extremely difficult to pick up, identify and scuttle such rumours.

There were two attempts at rumour control. Police were asked to tell everyone who came in, everyone they talked to that there was no further danger from Tracy. And a reporter was recruited by the director of emergency services to prepare messages that could be passed along to the community centres by loud hailer.

Darwin was indeed in critical shape.

Initial Response

Given the problems of transportation and communication, it was inevitable the first responses to Tracy would be isolated and unco-ordinated. Two of them involved the agencies most experienced in dealing with emergencies: the hospital and the police. But others such as the PMG (telephone communications), works (electricity, water, power) and the fire department were soon pitching in.

Initial activity begun at schools and shopping centres. Residents flocked there because these larger buildings had survived. Soon emergent leaders began to organize these centres — brewing tea, directing the collection of food, etc. As the day wore on, other supplies — baby clothing, water (by truck), etc. — were delivered to these centres.

At the hospital, the staff immediately geared up for an influx of casualties. The casualties did come; and they were all treated.

At first, however, the flow was relatively light. People had difficulty getting through the debris. Many of them also were given treatment at the emergency medical centres that had been established (though those at the hospital at first were not aware of their existence).

But, before long, activity increased. Somewhere between 500 and 1,000 casualties were treated at the hospital on Christmas Day. About 120 persons were admitted. (The hospital also became an emergency supply centre: ambulances — once they started operating — came to the hospital to pick up supplies for the emergency medical centres.)[33]

At the hospital, too, providing solace, were the members of another relief agency, the Salvation Army.[34]

> . . . The Salvation Army, rigged in their uniforms, dispensing their tea and buns. All smiles. I remember in 1945, Hiroshima . . . and there they were, just as calmly, the sallies, handing out the same inevitable tea and buns . . .

And, even as the emergency medical work went on, the hospital was receiving help from works crews to get its own services partially restored. A 20-man crew replaced one damaged roof and put up a shelter for emergency generators. Extra generators were brought in and installed and steam capacity was returned. (Water was still not available so the nurses' swiming pool was used as a supply tank.) Then, soon after as a result of work begun soon after dawn the water flow was restored: the hospital was essentially functional. Its one major problem was that volunteers —and there were many of them — could not find their way around the building.[35]

At the police station, the situation was equally if not more pressing. The public — uncertain about what had happened and would happen — turned to the police for advice and information. People poured into the station seeking help and advice. They also carried their dead to the police station for lack of a better place to go.

Police headquarters also linked up with the ambulance service. A new aerial was attached to a tree and police radio cars were stationed at the hospital and police headquarters so a temporary communications link could be established. (The phone link was put in later that day.)[36]

Officials, too, sought out police headquarters as a place where other officials could be met and decisions could be taken.

The emergency health director came in, the fire chief with him. The permanent secretary arrived. The director of emergency services came, too. The PMG man came in as did the works people. The harbour master came and so did a representative of the armed forces. The mayor wandered in, a journalist along with him. Police officers reported for duty. And Stretton — when he arrived later that day — was taken directly to police headquarters.

The police had, of course, been on duty all night and had been responding to enquiries as best they could. They began to operate more formally shortly after 8.00a.m. when, at a meeting called by the commissioner, senior officers were assigned specific duties, duties such as keeping records, looking after the bodies, welfare, transportation, communications and — most important — the crucial requirement of going out to assess the extent of the damage so

the information would be available when decisions had to be made.

As a result of this meeting, the police approached the school authorities to ask for and get permission to formally use the schools as emergency centres.

They also sought out the coroner to get his permission to deal with the dead. The heat, humidity and lack of power to cool a morgue made some action urgent. It's not clear when the dead were actually buried (Stretton reports seeing the bodies Christmas evening, but they appear to have been gone by the following day.)[37]

> Everyone came to the police station. There wasn't much doubt as to who was running the show. It was the police commissioner.
>
> I said to the commissioner, "Is there anything we can do?" He said, "We would like permission to use the schools." I said I didn't think he needed permission.
>
> We had power all night at the police station. We had power for the next six or seven days. That's why the police station was such an obvious choice as h.q.

The police not only acted on their own. They acted in consultation with others.

The first important caller about 9.30a.m. was the director of health.[38] He had already been to the hospital and he was working his way back through the city. He had seen a light at police headquarters so he came in. He sat down with the commissioner and drafted a message to the outside calling for help. His instructions: send it to anyone.

Then at about 10.00a.m. the permanent secretary came along (he had been trapped in the wreckage of his home). He, too, felt he should send a message reporting what was known and asking for assistance. It was also drafted with the help of the police commissioner. That message — drafted just a few hours after the storm had passed — made the first mention of an evacuation (though it was still in the context of evacuation of casualties).[39]

Soon after, the director of emergency services arrived. He had started his day by rescuing his daughter, by looking after his family and his neighbours and had been picking his way — it took hours rather than minutes — by car to police headquarters. He too became involved in consultations with the commissioner and the permanent secretary. One result was a dcision to convene a full leadership meeting around 2.00p.m.

And — elsewhere — a number of critical actions were being taken quite independently.

The PMG had begun to restore more regular communicaitons. The order line to Mount Isa and the outside was manned and in service. Work was begun on drying out the telephone system. By 11.00a.m. an emergency line was hooked up between the hospital and the police.[40]

The works people — power, water, roads — had also begun to function. They had — by cutting off all but one water line — restored water service to the hospital by 1.00p.m.[41] Along with some private contractors they had been able to clear a route to the hospital and other major arteries making it possible, once again, for some traffic to flow.

> Whereas you could hardly drive in the morning, you could drive along most roads, major roads by afternoon . . . just had graders and dozers clear a track. . .

And — at the fire department — after the fire chief had consulted with the police commissioner and others, firemen began delivering blankets, mattresses and hurricane lamps to the various emergency centres. Later in the day, they used 500 gallon pumper trucks to supply water to people in these centres. (People sometimes lined up beside the truck in a long queue with paper cups.)[42]

And — because of the catastrophe — one other development was taking place on an individual but mass basis. Some people — left with transport — had decided to abandon

Darwin and head south. It's been estimated that roughly 2,500 people — five percent of the city's population — left Darwin by road on Christmas Day.[43]

> People were evacuating themselves in all the vehicles possible. People left in some of our vehicles. . . which we weren't happy about . . . and other government vehicles I assume. A week later, some of them reported they were in Brisbane with our vehicles. . . .
>
> We had plenty of looting . . . they were carrying the town away. Refugees were pouring out of Darwin and some of them in the early stages carried looted property. One party was arrested in Alice Springs with a load of television sets and air conditioners. . .

Convergence

Inevitably, Darwin suffered from serveral forms of convergence despite the fact moving about was so difficult and despite the fact communications were so battered out.

At first, there was informational convergence, a flood of phone calls from the south. The police had abandoned their phone between 3.00a.m. and 4.30a.m. because of the danger. When they returned it started to ring.

> We got everybody . . . first to call was the weather bureau from Perth to tell us the cyclone was coming . . . general called wanted to know what was happening (Stretton) . . . rang hospital . . . she said no patients hurt . . . she said the place had been unroofed . . . the telephone was still going . . . all the radio stations from the south . . . they all rang . . . 10 of those . . . one after another . . . we said we didn't know. . .

Finally the telephone failed and the calls ceased. Many of the policemen saw that as a blessing.

Then — once the storm blew by — there was convergence in the form of a flow of people to two major centres — to the hospital (those who needed medical attention) and to the police stations, those with dead or in need of advice, those with official responsibilities.

> . . . members were being continually approached for immediate assistance or information . . . police enquiry counters were deluged by civilians seeking assistance and information . . .

Many of those who came, came because they had tried other locations and found them inactive. One man went to the civil defence headquarters, found one person there, was told the bunker had been abandoned, so, later, went to the police headquarters. Another started off at the hospital, checked in at both the ABC radio office and the telephone office then, finding no communications there, went on to the police station.

Next, as the civilian and government machines began to clear the roads, the parade of locals began, people wanting to know how bad it really was.

> People out driving just to have a look at that stage. . . you couldn't move anywhere on the roads . . . soon as the bulldozers got (the debris) out of the way there was a line of traffic . . . if you wanted to go the other way you couldn't move . . . It was all a sort of traffic jam . . .

At the hospital traffic and parking problems became so severe at this point that the staff recruited a volunteer to direct traffic . . ..

> Strangely enough this worked very well . . . we didn't even use one of our own staff . . . all we did was put a white coat on him . . .

The hospital also, apparently, had an over-dose of staff. One of the relief doctors reported "in retrospect, it is clear that there was an over-response by volunteers who were not necessary".[44]

Then, before long (it's not certain whether this began Christmas Day or early Boxing Day), the flow of people began to come in from the outside. There were the curious and the officials and their number reached very large proportions. Road blocks were established starting on the morning of the 26th.[45]

Organization Returns

At first, all of these activities — including the departures — took place independently. But by 2.00p.m., about nine hours after the storm passed, a semblance of community organization began to return. In the wake of a series of four or five smaller and informal sessions, the first formal meeting of community leaders was held at police headquarters, the place now clearly accepted as the logical spot for emergency direction.

Some of those present had drifted in. Others had been specifically summoned by the police. Almost all were members of the emergency committee created as a result of the Ashmore report. The police — in locating people for a meeting — assumed committee members were the proper ones to call.

> It was a very crowded meeting. I became unconfortably hot . . . without the air conditioning. (Emergency power did not cover air conditioning.) It went on for some time.
>
> There was a roomful of people . . . .began the meeting by telling everyone he was calling another meeting . . . .he asked if anyone did have any immediate information.
>
> The meeting was noisy and badly conducted . . . especially with people yelling from the back . . . I was pretty dispirited. It wasn't going anywhere.

The meeting also, at times, disintegrated into charges of inadequate warning and inadequate response. At one point a row was averted only when the permanent secretary passed around a copy of the telexes that had been sent some hours earlier asking for help and made a statement a response had been received.[46]

It was hardly surprising the meeting had low morale. The reports that were given were discouraging. Power would take days to restore. The water would be some time coming back in. There was a danger from disease, especially from the poor sanitation, the lack of water, latrines, the rotten food, the presence of pets.

The question of evacuation came up at that first meeting but nothing was decided. Those present agreed to come back later Christmas afternoon for a second evaluation. But a start had been made: most community leaders — the permanent secretary, the director of health, the emergency services director, the police commissioner, the mayor, the chief fire officer — had been brought together for consultations.

The second *major* meeting at 6.00p.m. was a more orderly and somewhat more cheerful affair. Some of those who had disrupted the first meeting (one or two had been drinking) were no longer there. And some of the reports were encouraging. The water had been restored to the hospital. Phone service between the hospital and the police station was back. Water was being distributed to the emergency centres. The traffic was once again flowing. Communications had been partially restored.

But despite the increased optimism — there was also agreement on one major point: Darwin had to be evacuated. The city could not carry on with its population of 45,000.

It seems clear that the driving force behind the evacuation consensus was the director of health. He presented the dangers of disease, the problems of sanitation. He argued his case very forcefully. But it seems also clear that no one at the second meeting (and all the key people, including the administrator, were present) challenged the director's argument. Darwin would have to be evacuated. There was no other choice. A reduction to figures of 10,000 (the eventual target) was even mentioned.[47]

> I viewed the director of health as being directly responsible for the decision to evacuate. Even at that first meeting he was stressing the health situation. He thought as many as possible should get out of the place . . .
>
> The director of health could be regarded as the biggest contributor to the decision to evacuate. But I think as with all the decisions this was taken as a consensus agreement.
>
> The decision to evacuate was taken on Christmas Day. It was taken by the committee that met that day. The principals were blokes like (the works director) who told what the state of play was with water and by (director of health) who was able to advise in medical reports. . .
>
> It's difficult to say how the decision arrived but . . . on the basis of reports . . . there was a consensus . . . primarily I guess (director of health's) advice on the health situation . . .
>
> Had another cyclone hit Darwin, the death toll could have been devastating. Darwin has a 30 or 40 foot tide. Could have been a thousand drowned. Logistical problems in getting food and water was just too much . . .
>
> There was a completely untenable position in Darwin. If the people had been left in Darwin there would have been another disaster on top of the cyclone.
>
> The fear of having the thing come back again was almost paralyzing . . . with all the debris lying around the carnage would be dreadful . . .
>
> I said I felt Darwin as a city had ceased to exist . . . the only thing to do was have a mass evacuation . . .

Stretton's account in *The Furious Days* conflicts with the version offered here. He states that although there had been a number of assemblies at the police station Christmas Day no positive decisions had been taken. He comments on this "lack of direction".[48]

The evidence from interviews suggests this is simply not accurate. The memories of the various participants about who was present and what was said tend to coalesce. It is possible, of course, time has brought such cohesion; but the accounts were collected separately (and many of these people no longer have any contact with Darwin).

What seems absolutely clear is that after a number of casual meetings and two major formal meetings the emergency committee did establish itself, did hear reports on what was going on and did agree evacuation was necessary. It also seems clear that that decision was a consensus.

In the light of subsequent research, the decision was also a crucial one. A psychologist, Gordon Milne, has produced data suggesting those who evacuated suffered emotionally more than those who stayed behind and this was especially true for people who did not return.[49]

> The extent to which a disaster victim(s) can cope and adapt may be well a function of their ability to remain inside the impacted community.

This finding is supported to some extent by a study done by a psychiatrist who found widespread trauma among the evacuees.[50]

Stretton, in his book lends some support to the theory by stating that by the evening of December 27th — just two days after Christmas — it was becoming difficult to get people to evacuate.[51]

> People had now got over the initial shock and were getting used to roughing it in the community centres; food and water distribution was now adequate and there was a growing feeling it was better to stay and see it out . . .

Milne says 25 percent interviewed said they regretted leaving, almost half said they could have stayed.[52]

Of course the story is more complicated than that.

Even though the decision to evacuate was taken by the local committee it did, admittedly, have an air of unreality attached to it. The roads south from Darwin are terrible. Many of Darwin's vehicles had been damaged or destroyed. The airfield was damaged. The navy was thousands of miles and perhaps weeks away. The leaders of Darwin — however much they might agree on evacuation — had little capacity to carry out that decision and no awareness of what resources might be available. In fact, they had little real basis for discussing alternatives either: Darwin is thousands of miles from Australia's other major centres in the south. Go or stay, Darwin would have to depend on outside help — and outside information.

After making the decision to evacuate, the community leaders agreed to meet the following morning. No immediate attempt was made to actively implement that crucial decision although most of the same people played all the key roles in what happened later. Later that night, the community leaders told their decision to Stretton and to the Minister for the Northern Territory, Rex Patterson. The minister endorsed the decision and gave Stretton the job of seeing that it was carried out. Patterson had decided en route Stretton would take over. (In a speech in Canberra in May 1976, Stretton reported that, on arrival, "it was put to me by some of the leading people that the whole of Darwin should be abandoned".)

Communications

The critical problem for Darwin was, therefore, as is often the case, external communications. The city leaders needed to report their problems to the outside and needed contact with the outside to establish the possibilities for future action. In Darwin on Christmas Day those were difficult tasks.

For because of the devastation in Darwin external communications, like internal communications, were in disarray. Many links were operating but they were scattered and generally ineffective though each system brought its separate results.

1. Telephone:
   The telephone system had worked most of the night and was still in operation when the first calls were made from the Natural Disasters Organization in Canberra (Stretton called the police personally) and from ABC, the Australian Broadcasting service. But most people weren't in a condition to talk on the telephone. Even the police had to abandon their communications centre when the walls of the police building began to bend. The telephone service to police headquarters was restored late Christmas Day, making long distance calls possible. In fact the commissioner was able to reach the commissioner in Victoria (Melbourne) to discuss possible police reinforcements.

2. Telex:
   The telex system functioned most of the night as well and it was through telex that the Tropical Cyclone Warning Centre at Perth acquired information that Tracy had hit Darwin. Perth passed this message along to Canberra and to Stretton. It was a direct result of this telex message that led to the despatch of an outside medical team to Darwin and to the decision to send in Stretton.

3. Order Wire:
   The regular sound link by which technicians talk from the television tower in Darwin to the next station in Mount Isa never failed. However, that link — the order wire — is not manned at all times. From 5.30a.m. until 9.00a.m. Christmas Day, technicians at the Darwin tower could see the incoming television signal: but they had to wait for someone to come in and man the wire before they could send messages out. Once the technician arrived at Mount Isa, however, the wire could be used to relay both

official messages and media reports. The order wire was also used by the army to re-establish a radio link: the army relayed to the outside of the frequencies on which its new link would operate. (See 10. below.)

(The technician came in to Mount Isa because operators in Sydney who could not reach Darwin asked that someone check the system. Once the technician arrived at Mount Isa, he was able to extend the hook-up to the south.)

4. Police Radio:
   Although the police radio was knocked apart when the aerial went down it was quickly restored to an emergency footing. Darwin police transmissions could be monitored in nearby communities and a number of attempts were made to hook up police-to-police radio. But this system was not used for emergencies.

   > We could at that stage have set up a radio to Alice Springs or Katherine and let somebody know exactly what happened. As far as I know at that stage no one knew. They were calling us. We didn't speak to them.

   The police in Darwin were first concerned with their own affairs, with finding out what had happened and how bad it was: sending messages down the line on the basis of scanty information didn't seem to make much sense.

5. Amateur Radio:
   There were a number of surviving amateur (ham) radio systems in Darwin which began, almost immediately, sending signals to the outside; one of these passed the news to Perth. Another established a hook-up with a ham operator in suburban Melbourne which led to a link with the police in Victoria (Melbourne is in Victoria)[53]. One of those messages enabled Darwin to confirm that the airport runway was clear and lit by flares.

6. Damaged Plane:
   A damaged plane at Darwin airport still had an operational radio and the pilot passed along some news to the south.

   > He didn't tell us much at all. His aircraft was out. He was buggered. We gathered there was severe damage at the airport. It was a very unsatisfactory conversation. He wasn't telling us much and then he went away.

   Despite its unsatisfactory nature that conversation led to the news being passed to the administrator who, as mentioned earlier, was home at Alice Springs. He caught a commercial flight to Darwin — one actually landed in Darwin mid-afternoon Christmas Day — and, by radioing ahead to Katherine, got nine medical personnel, including eight nurses, to join him on that flight to assist in Darwin.[54] (The staff at the hospital were surprised and pleased to have this early and useful assistance.)

7. Nyanda;
   A ship that came into Darwin harbour after the storm was able to use its radio to reach the marine operations centre in Sydney. At first the ship could only report damage to the harbour. Later messages were taken by courier to the ship, then later still relayed from a police car at the station to the ship.

8. St Vidgeon's:
   Another radio hook-up involved a connection between the police at the suburban Casuarina station and the medical alert radio system at St Vidgeon's, a near-by community. A number of messages were passed by this route. In addition, the northern medical aid system was automatically switched to St Vidgeon's. There a radio-telephone system could be used to hook into the regular telephone system at Katherine.

9. Works Radio:
The works radio system was operating from Darwin to Alice Springs, Tennant Creek and Katherine and was used for works messages.

Some equipment and supplies were needed for works purposes and the handling of such requests was taken care of by the works radio system.

10. All three services — army, navy and air force — lost communications during the storm but all regained contact on Christmas morning. The army, for example, made contact with Townsville on the east coast by using a field radio unit in a Land Rover.[5 6] None of these systems were integrated into the community systems so they could be used for civilian traffic.[5 7]

The problem then with external communication was not the absence of links with the outside; there were a fair number. (There was even a radio at the hospital which was never even tried though it could have linked to Katherine, from where first help actually came.) At no time did Darwin lack at least one functioning communications link to the outside. But for a great deal of time the links that did exist were not known, not accessible or not used by those exercising a leadership role at police headquarters. The almost total failure of communications within Darwin meant that the survival of those external links was of limited value. The pilot of the damaged plane was typical: he could communicate but he had nothing to say.

> One was unaware of the communications facilities that existed. . . because of the devastation and the difficulty of moving from A to B . . . once you got to whatever communications you had . . . you weren't going to drive back to see if anyone knew about it . . .

Conclusions

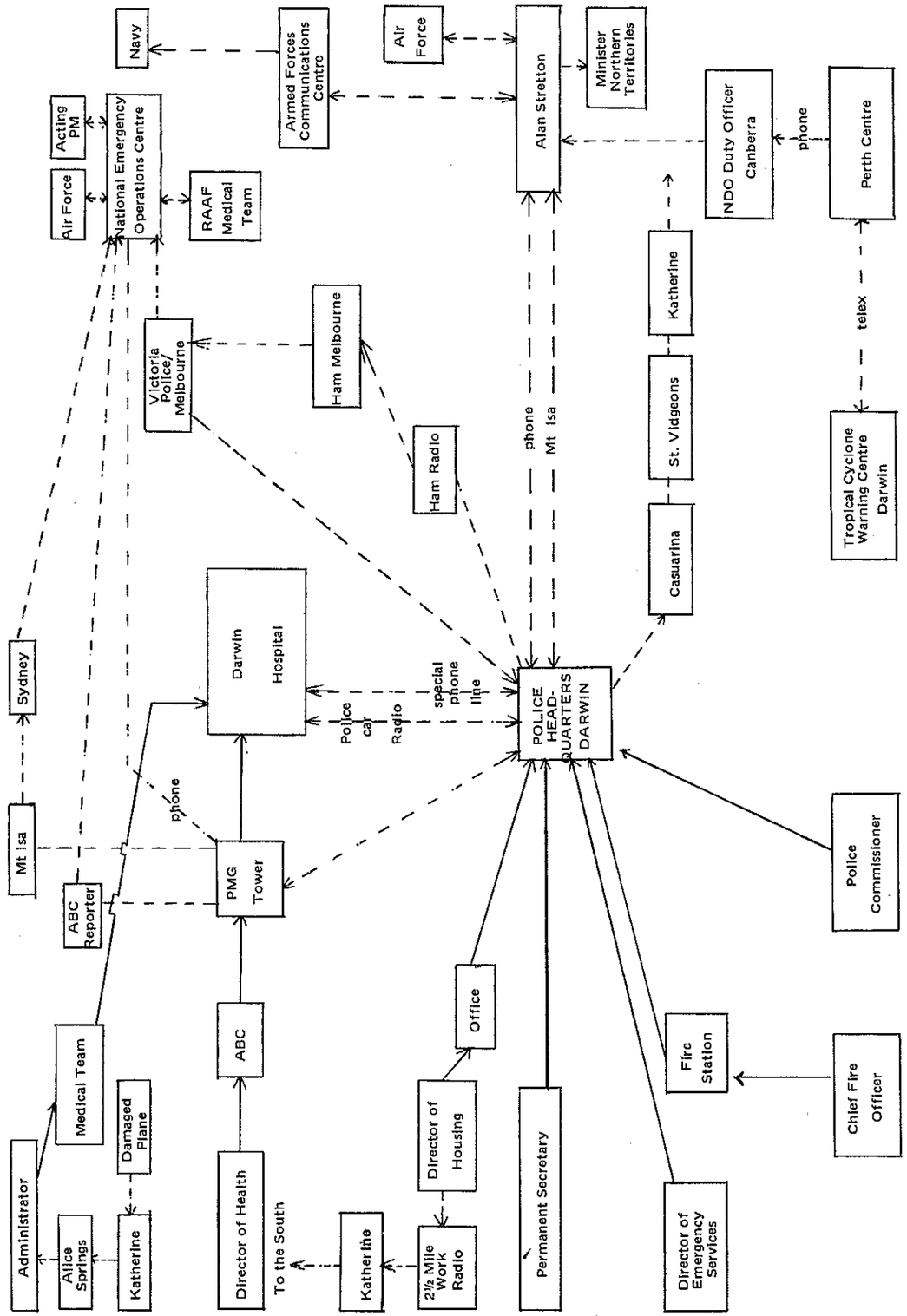
In summary, then, though Darwin was devastated, a great deal was accomplished on day one.

Community shelters were established and operated. Medical services functioned and functioned rather well. The dead were collected. Transportation was substantially restored as roads were cleared. Initial water services and communications were re-established. An emergency centre was created and, in it, local authorities met, reported, debated and made a critical major decision. Communications were gradually organized within Darwin and then contact with the outside world, first framented, was gradually recreated in an organized way, and tied to those in authority in Darwin.

By late Christmas night — less than 24 hours after the storm struck — effective control of Darwin had passed to an outsider. The locals were still involved — indeed much of the later work was done by local officials — but the direction was in outside hands. Before that happened, however, those in local control had demonstrated that people — even in extreme conditions — are capable of re-establishing social order. "Day One In Darwin" confirms again man's incredible capacity for survival as a society.

"Day One In Darwin" also demonstrated — as is ever the case — the crucial role of community communications in the wake of crisis. It reinforced the lesson learned by Samuel Henry Prince in Halifax . . . roughly 60 years earlier.[5 8]

> The vital place of communication in society was recognized at once. It is a major influence in association and upon it in disaster depends the immediacy as well as the adequacy of relief.



FOOTNOTES

[1] An official report says 9,000 of 12,000 homes were destroyed and "almost every other building" was damaged. "Special Edition — The Darwin Situation" *Housing and Construction News* 2 January, 1975. p.1.

[2] The director of housing and construction, L.G. Redmond, reported "there was no water supply, no power and 90% of power distribution lines were destroyed". L.G. Redmond, *Cyclone Tracy Emergency Restoration Action by the Department of Housing* Jan. 20, 1975. p.1.

[3] Alan Stretton *The Furious Days. The Relief of Darwin* (Sydney, 1976). p.20. The death toll figure is based on 49 lives lost in the city, 16 more lost at sea.

[4] The difficulty of making an accurate account is illustrated by a special edition of *HEALTH* which notes 32 cases to surgey on page 9 and 35 on page 21. It also says it was impossible to keep records in a disaster of such magnitude. "Special Darwin Issue" *HEALTH* Vol.25 No.2, p.21. Stretton is also inconsistent. In his major report, he uses the figure of "over 128" on page 42 and "over 140" admitted on page 2. Report of the Director General *Darwin Disaster: Cyclone Tracy* (Canberra, 1975). In another article, it is stated "150 were admitted . . . and over 30 major surgical operations were performed". James Scott-Findlay, "Darwin and the Natural Disasters Organization" *The Medical Journal of Australia* May 24, 1975. p.645. Gordon Milne in his sample study found 5.2% of adults had been injured — which would put total injuries around 2,000 to 2,500. Gordon Milne "Cyclone Tracy I: Some Consequences of the Evacuation for Adult Victims" *Australian Psychologist* Vol.12 No.1 p.48. O'Shea would put it much higher. He states "90 percent of the Darwin population received some sort of injury . . ." R.F. O'Shea "The Darwin Cyclone Disaster Experience of the Queensland Medical Team" *The Medical Journal of Australia* May 24, 1975. p.49. Darwin wasn't alone in having problems compiling statistics. Officials in Sydney admit "the exact number of refugees who passed through . . . is not known . . . because of poor registration facilities". "S.E.S. Role in Darwin Evacuation" *State Emergency Services Bulletin* Autumn, 1975. p.6.

[5] According to Stretton's official report, 25,628 people were evacuated by air, 9,734 by road. Roughly 1,000 persons were allowed into Darwin between Christmas Day and December 31st. This meant the population fell from 45,000 on Christmas morning to 10,638 by New Year's Eve. Report of the Director-General *op.cit.* p.32.

[6] The way that decision was taken and the reasoning behind it are described in detail in Stretton's book. See: *The Furious Days op.cit.* pp.38-41.

[7] *ibid.*

[8] *ibid.* p.1.

[9] Interviews were conducted with almost every key person including Stretton, his assistant, the administrator, the permanent secretary, the director of emergency services, the police commissioner, the director of health, the director of housing and construction, senior police officers, the mayor, a number of journalists, the director of education, the chief fire officer, the officer in charge of the PMG and a number of others including ham operators, police elsewhere, the public relations officer, etc. All together, about 70 interviews were conducted. In addition, the author was shown informal notes, letters, telexes, private reports and semi-offical documents. All of this material — both the interview material and the documentary material — was made available on the understanding it might be used providing it was not attributed as to source. This is the usual understanding covering research done by the Emergency Communications Research Unit (ECRU) at Carleton University in Ottawa, Canada. All quotations unless otherwise identified are from persons involved in the events described and are mainly from interviews. One or two persons kept private accounts and allowed quotation on the same basis as an interview.

[10] Samuel Henry Prince's classic study of the Halifax explosion is almost a prediction of what happened in Darwin. How little has changed in nearly 60 years! See: Samuel Henry Prince *Catastrophe and Social Change* (New York, 1920).

[11] The first raid — February 19, 1942 — caused 243 deaths and 400 injuries. The incoming Japanese planes had been spotted but the warning was not passed on. Wallace Crouch "Was Darwin Unprepared?" *The Sydney Morning Herald* December 27, 1974. p.7.

[12] Information obtained in an interview.

[13] These earlier cyclones are described in some detail in W.R. Wilkie and A.B. Neal "Meteorological Features of Cyclone Tracy". Paper presented to "Symposium on Natural Hazards in Australia" Canberra, May, 1976, pp.10-11.

[14] The background to this decision is explained in *The Furious Days op.cit.* pp.12-13. The report, known as the Ashmore report was adopted just 10 days before Tracy. J. Eugene Haas, Harold C. Cochrane and Donald G. Eddy "Darwin, Australia, Christmas 1974. Consequences of a Cyclone on a Small City" *Ekistics* 260 July, 1977. p.46.

[15] "It is the responsibility of the survey section to provide rapid, accurate information on conditions within the disaster zone. . . " As will be seen it's a good idea but it was impractical in Darwin after Tracy. Quote is from the Ashmore report, November, 1974.

[16] *The Furious Days, op.cit.* p.1.

[17] A complete list of the warnings is contained in Department of Science Bureau of Meteorology *Technical Report 14 Cyclone Tracy* March, 1975. The classic announcement must be this one: "The eye of the storm is expected to move over Darwin soon." 2.30a.m. p.34. ABC also backed up the official weather warnings with detailed advice starting just after noon on Christmas Eve: "A cyclone is imminent. A few hours of organized family action can turn the odds your way." Report of the Director-General *op.cit* p.61. The information about parties was volunteered in many interviews and confirmed in private diaries.

[18] Interview data. Material not otherwise attributed was obtained in interviews and confirmed by at least two people.

[19] "Special Darwin Issue" *HEALTH op.cit.* p.7.

[20] There was, however, extensive damage. Of 11 wards, one was undamaged, six were partly usable, four were not serviceable. C.H. Gurd, A. Bromwich and J.V. Quinn "The Health Management of Cyclone Tracy" *The Medical Journal of Australia* May 24, 1975. p.64.

[21] "A Son, Barry Edward, Born in the Eye of Cyclone Tracy" *HEALTH op.cit.* pp.36-37.

[22] Jim Quigley, an ambulance driver, is quoted as saying "one of the big difficulties was finding his way through the battered streets of the city in the early morning of Christmas Day. There were very few signposts still standing and even the landmarks he remembered were gone or were changed beyond recognition". *HEALTH op.cit.* p.20. Stretton reports his driver got lost twice on the way in from the airport. *The Furious Days op.cit.* pp.44-45.

[23] Once people left it was not possible to communicate with them so there was no way of establishing the reason for lengthy absences. An officer left the police station on Christmas morning then disappeared for four hours. No one knew where he was. He had no way of reporting in.

[24] There were some suggestions the emergency radio system could have been quickly restored if proper action had been taken. As it was the ABC station began to broadcast locally the afternoon of Boxing Day (Dec.26).

According to one source, the signal was sent from Darwin out via microwave and back to the civil defence transmitter via shortwave, a 6,000 kilometer round trip to serve Darwin. Geoff Heriot "When Darwin Called . . . ." *Professional Engineer* March, 1975. p.4. Other data suggests this route was available but not used. It became available just as the regular ABC transmitter was able to operate on low power. However, the emergency transmitter was used later while major repairs were made to the regular transmitter.

[25] Thelma Kirkbride "Two Thousand Miles Away: Darwin's Cyclone Tracy". Undated, unpublished. p.2.

[26] Cecil Holmes "The Night of the Frogs" *Overland 62* 1975. p.9.

[27] One of the first emergency supplies was a large shipment of transistors. *The Furious Days op.cit.* p.61.

[28] Report of the Director-General *op.cit.* p.10.

[29] Gurd *et.al.* report that when the flow of casualties slowed down at the hospital it was impossible to know if all had arrived or whether "large numbers could not yet be moved from the northern suburbs." Gurd *et.al. op.cit.* p.642.

[30] "A Night of Terror" *The Black Swan,* January 1977.

[31] Holmes *op.cit.* p.5.

[32] These rumours were reported in a number of interviews. See also: Bruce Stannard "Darwin: Blood and water and no copy slips" *The Journalist* January, 1975. p.7.

[33] The hospital operations are described in a number of places in considerable detail. Gurd *et.al. op.cit.* p.642, *HEALTH op.cit.* p.22. This article estimates there were 20 emergency centres. On page 32 the same source — a doctor's diary — describes activities at one such centre.

[34] Holmes *op.cit.* p.7. Other evidence suggests these Salvationists were not part of a general Army response. Darwin's Army Citadel had been totally destroyed by Tracy.

[35] This is mentioned in two places. *HEALTH op.cit.* p.10. Gurd *et.al. op.cit.* p.642 say it "could have been minimized with better signposting".

[36] *HEALTH op.cit.* p.20.

[37] Stretton, describing his arrival Christmas Day, reports seeing "the broken and mutilated bodies" and refers to his discussions "amid the corpses", *The Furious Days op.cit.* p.46. Stannard reports visiting the police station the following morning and finding "the floor covered in blood. The cyclone victims had been there before burial". Stannard *op.cit.* p.7. One source said the burials took place Christmas Day. Another said it was two or three days later. In any case, all the dead were identified.

[38] It was possible to piece together the sequence by comparing interview notes with a time log. The sequence seems entirely accurate. The time log is not as precise.

[39] In his message, the administrator, Alan O'Brien, stated as points (e) and (f) "Return flights may be used to solve probable evacuation problems." "Director of health has advised casualties may have to be evacuated." Report of the Director-General, *op.cit* p.9.

[40] "By 11a.m. emergency power was restored, batteries re-charged and portions of the Darwin exchange were operational." *ibid.* p.41.

[41] Redmond says one million gallons per day were supplied by 1.00p.m. Redmond *op.cit.* (There are no page numbers in this document.)

[42] Northern Territory Fire Brigade Annual Report 1976, pp.1-2.

[43] Report of the Director-General *op.cit.* p.32. Some of the enormous problems facing those who evacuated by road are described in "Road Flight From Darwin" *Petroleum Guide* April, 1975. pp.136-138.

[44] Scott-Findlay *op.cit.* p.645. He states the vast majority of immediate medical aid had been carried out before he arrived with Stretton late Christmas Day.

[45] In a news conference on Boxing Day, the Minister for the Northern Territory, Rex Patterson, announced "we have taken steps to stop people getting into Darwin. It is incredible the number of people who are sightseers and all that. . ." Transcript of ABC Tape WP 1888. Undated document containing transcript of most federal news conferences during the period after Stretton's arrival. p.5. See also: Stretton "Ten Lessons From the Darwin Disaster" *op.cit.* p.5. "The Darwin disaster showed after a disaster occurs there will be a potential influx of people into the disaster area. The isolation of Darwin helped in reducing the number of sightseers nevertheless the number of people with reasons for entering the disaster area was quite surprising. The never-ending list included members of Parliament (six cabinet ministers arrived in Darwin on the one day), government officials, media and press corps, welfare and philanthropic representatives, businessmen who had branches in Darwin, consular and diplomatic representatives and a host of volunteers who considered they had some special expertise to assist in the relief operation.".

[46] HEALTH *op.cit.* p.5.

[47] *ibid* p.6.

[48] In his book, Stretton mentions (p.48) "there had been a preliminary meeting of some local officials . . . but no decision had been taken . . ." Then, later (p.49) he says at his meeting just before midnight with the police commissioner "we all agreed there would have to be a major evacuation. . . " *The Furious Days op.cit.* His initial report, however, is somewhat different. He mentions first (p.4) that "initial meetings of the local emergency committee had been held during the day. . then later (p.31) "it became obvious that a large scale evacuation of the population. . . would be necessary. This subject was first disucssed by local officials on the morning of 25 December and again at a meeting of the Emergency Committee on the same afternoon.". Report of the Director-General *op.cit.* p.31. *HEALTH* states (p.6) the decision to evacuate was taken at the first, formal 2.00p.m. meeting. "The meeting agreed that Darwin had for the time being ceased to exist as a city and that it would be necessary on health and other grounds to evacuate 30,000 people, and do it quickly." *HEALTH op.cit.* The general agreement with the decision to evacuate is clear in Redmond's report: "It was apparent that damage was so widespread and severe that a massive evacuation of the population in Darwin would be required . . . " Redmond *op.cit.* Haas *op.cit.* also says, "It was decided before noon of Christmas Day that the population would have to be thinned." (p.46). The interview data — supported in some cases by memos written at the time — supports the view that the decision was taken around 6.00p.m. though it was discussed earlier.

[49] Milne "Cyclone Tracy I" *op.cit.* p.53.

[50] Gordon Parker "Psychological Disturbances in Darwin Evacuees Following Cyclone Tracy" *The Medical Journal of Australia* May 24, 1975. pp.650-652.

[51] *The Furious Days op.cit.* p.107.

[52] Milne *op.cit.* p.52.

[53] This station was not picked up at first because the operators were new to Darwin and were using their old southern call sign. Finally another person asked to try: he got an immediate reply when he used his own Darwin call sign.

[54] *HEALTH* mentions the arrival of a private practitioner, eight nurses and a radiographer from Katherine in mid-afternoon. *HEALTH op.cit.* p.9.

[55] *HEALTH op.cit.* pp.26-28.

[56] Bruce Juddery "Emergency Plan Was Well Timed" *Canberra Times* Dec. 30, 1974. p.2.

[57] Major-General Alan Stretton "Ten Lessons From the Darwin Disaster". Undated monograph. 9 pp. p.2. Stretton reports the Army and RAAF systems went off the air at 5.00a.m., the Navy earlier, at 3.24a.m. An unidentified air force document says the air force log shows "4.30a.m. All communicaitons lost . . .".

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Darwin: After Cyclone Tracy, 1974

(Photo: Courtesy of Herald and Weekly Times Melbourne)

THE MEDIA AND COMMUNITY MORALE

Joe Oost

Prior to coming to terms with the theme proper of my talk, I'd like to briefly acquaint you with some of the history of the National Disasters Organization, in particular, some of the developments dealing with emergency radio and television broadcasting which occurred during the last three years.

I have drawn from information contained in my own report to the Federation of Australian Radio Broadcasters, notes from Dr J. Price on the subject of "Minimizing personal distress in Natural Disaster" and a report from a seminar under the title "The Media and the Disaster Scene" held at Mr Macedon earlier this year.

Some years ago a committee was formed to examine broadcasting facilities which could be required in the event of a disaster occurring of such magnitude that normal communications were disrupted in the more populated areas.

This committee, the Emergency Broadcasting Committee (E.B.C.) was originally oriented, mainly, towards maintaining communications during and after disasters resulting from international conflict, nuclear attacks, etc.

The E.B.C. comprised representatives from:

The Natural Disasters Organization
Department of Defence — Joint Communications
Department of Media
Australian Broadcasting Commission
Co-opted member: Australian Broadcasting Commission

In December of 1974 Cyclone Tracy struck Darwin, resulting in a virtual total disruption of communications. In the light of that experience, the original committee was re-activated and addressed itself to the problems associated with natural disasters.

The Committee met in June 1975 under the chairmanship of Major General Stretton, the Director-General of the NDO.

In their wisdom members of the E.B.C. considered that the commercial radio, and television stations, could provide an extremely broad coverage in the type of situation they were dealing with and the then Federation of Australian Commerical Broadcasters as well as F.A.C.T.S. were invited to be represented on a co-opted basis.

At the 1975 Convention, Federation nominated Ken Mulcahy (4IP Brisbane) and myself to represent them. The first meeting of a Facilites Working party took place in

Mr Joe Oost: Regional Manager A.W.A., N.Q., incorporating Broadcasting Stations 4CA (Cairns) and 4TO (Townsville). Elected representative of Federation of Australian Radio Broadcasters in 1975, mainly as a result of his radio station's involvement with communications during Cyclone Althea. Member of Emergency Broadcasting Committee under Chairmanship of Major-General Stretton. Member of Facilities Working Party and Task Group for Natural Disasters Organization.

Sydney in October, 1975. Mr Mulcahy withdrew from the Committee in November, 1975.

Since then, seven meetings of the Organization have been held. The decision making process was greatly frustrated by the changes which were taking place in the member bodies during that time.

The Natural Disasters Organization, Department of Defence and the A.B.C. were suffering from drastic expenditure curtailments as a result of a change in Government, the Department of Media disappeared, the Australian Broadcasting Control Board split into three and the Australian Telecommunications Commission became Telecom Australia.

Surprisingly, we retained very much the same people on the Central Committee which at present consists of members from:

The N.D.O. Canberra
The Department of Defence
Telecom Australia
The Postal and Telecommunications Department
The A.B.C.
F.A.R.B. and F.A.C.T.S.

The principal charter of the E.B.C. is, as stated earlier, to maintain the communications during and after natural disasters occuring in the Commonwealth.

As a first step, the Department of Defence and the Natural Disasters Organization compiled maps, showing the areas of coastline in the Northern parts of the Continent which are prone to cyclones and their frequency. These maps show, for example, that the whole of the Northern Coastline, North of latitude 27° south is subjected to a cyclone threat varying in probability from 0.4 to 1.2 cyclones per year. The more densely populated area between Cooktown and the Gold Coast has been subjected to ten cyclones crossing the coast every 100km. during the last 66 years. Cyclones are therefore a major and recurrent threat. As well, flood-prone areas were identified along with zones, where high seasonal bush-fire danger occurs, and a series of maps showing the West and South Australian regions and the areas near Maryborough and West of Sydney where earth tremors are likely to occur.

As a second step, the Australian Broadcasting Control Board prepared coverage maps, showing the daytime and nighttime coverage areas of all Commerical — and National Radio and Television Stations.

A study of the two sets of maps, showed clearly that certain disaster-prone areas were better served than others, as far as the air media, radio and television are concerned.

A Task Group was formed:

— to study gaps in existing coverage and possible measures to overcome deficiencies;
— to determine which existing stations are most vulnerable to damage in natural disasters, particularly in areas covered by one service only:
— to recommend programme link requirements and arrangements necessary to enable effective use to be made of available facilities;
— to develop specifications for a transportable emergency station including holding and deployment specifications;
— to prepare plans and draft programmes to strengthen existing facilities to the highest possible degree of reliability.

Taking into consideration dispersion and duplication of stations, the Mackay, Sarina and Cairns areas were those of high priority. These centres were visited by the Task Group

in April last (1978) when we met with local radio — and television station Managers, commercial and national as well as with local representatives of S.E.S., Police and Telcom.

Coming back, for a moment to a point raised earlier: the strengthening of existing facilities to a high degree of reliability. This must surely be seen as a matter for individual operators. It is obviously of utmost importance to remain on air during a natural disaster not only from a community service viewpoint but for commerical reasons as well.

Strict routine maintenance to all standing rigging and transmitter housing, ample fuel stores for emergency power plant, and standing emergency orders at the stations which can be put into operation quickly, are just some of the basics.

The development of operation routine is essentially a joint responsibility of the local counter disaster authorities and local broadcasting stations. It should be kept in mind that, with the exception of some of the bigger cities which have fulltime officers heading up the counter disaster — or State Emergency Service, in smaller centres the chiefs of these organizations are volunteers who come from all walks of life.

In summary: the progress to date is that:

1. The preliminary studies have been completed.

2. An emergency transmitting station, capable of broadcasting on any frequency in the M.F. band has been made available by Telecom. On advice by the Department of Defence, the unit is being kept in Adelaide from where it can be deployed and rendered fully operational in Northern Centres in 18 hours.

3. The Task Group's report on the North Queensland visit has been tabled at a meeting of the E.B.C. in Melbourne on October 25, 1978.

4. The Federation's Engineering Committee will develop specifications for a simple H.F. receiver to be a recommended piece of equipment at the transmitter site of certain stations. This receiver can be used as a one way link from S.E.S. Head Quarters to a broadcast transmitter.

5. The possibility of a low power standby transmitter held at certain station's studio premises will be discussed.

For the purpose of the subject under discussion, the term media includes radio, television and press.

Radio, in particular, but also television have the potential to play cirtical roles at the time of natural disaster; the role of the press is more pronounced during the post-impact phase. Of course the media would become automatically involved whenever any sizeable emergency occurred when, generally speaking, it would tend to fulfil one or all of the following roles:

(i) The news and information role (that is, the normally accepted role of the media).

(ii) The disaster control assistance role (such as the transmission of information and instructions from the disaster control authority to the stricken community.)

(iii) The disaster information input role (for example the transmission of appropriate information to the disaster control authority, thus contributing to the decision-making capability of such authority).

Three phases should be distinguished which are: the pre-impact phase, the impact phase, and the post-impact phase. The role of the media in each of these phases can then be considered.

The pre-impact phase of radio lies primarily in the provision of objective information about the impending disaster. This information should include details about the likely magnitude of the disaster and advice to precautionary measures to be taken. The information should be provided in concrete terms which will be meaningful to those likely to be affected by the disaster, thus enabling them to make accurate judgments about their own situations.

Effective communication links between the State Emergency Head-Quarters and the media are an absolute necessity, and pre-arranged plans should exist, capable of being brought into operation at the onset of a natural disaster.

During this phase radio and television will be the main media sources involved.

During the impact phase the media should have the responsibility of keeping the community informed of the extent of the hazard.

Responsible and accurate reporting is of considerable importance. Many people will already be seriously alarmed and sensational reporting may make their anxiety much worse.

Proper liaison with official emergency personnel is essential. Radio and Television broadcasters should not assume direct responsibility for giving directions to disaster victims.

The media has a variety of important functions to perform in the post-impact phase. First, as far as the victims of the disaster are concerned, information should be made available about the location of State Emergency Services and Local relief centres. Second, information about the services available and the rehabilitation activities of State Emergency Services should continuously be made known. Third, it is important to remember that families are often split up by natural disasters. As long as some family members are unaware of the location and safety of others, they will experience a great deal of anxiety. By broadcasting information regarding people's whereabouts, a great deal can be done to alleviate this form of anxiety.

The second major role in the post-impact phase should take into account the so-called convergence phenomenon. Typically following a natural disaster large segments of the population converge on the disaster scene. Some people are helpers, some simply as on-lookers. A valuable service can be played by the general public at this time but by the same token onlookers can impede the recovery process.

Indiscriminate media calls for donations in kind and for volunteers to help in disaster affected areas can cause far more problems than they solve. When calls for volunteers are made, these should be sanctioned by official emergency service personnel.

In all stages of the disaster, radio and television can most effectively function as the communication arm of State Emergency Services. It is important for broadcasters to have some understanding of the role of other groups and individuals in the disaster situation, and an appreciation of victim responses to disasters.

The role of the press is less immediate. "Instant awareness' is provided by the electronic media. The press will obviously provide fuller accounts of the effects of the disaster. Its most useful role will be in the rehabilitation phase when it should provide in clear and simple terms information to victims as to the facilities and resources available to assist them. It is frequently the case that victims are unaware of their entitlements from State sources, and the press can play an important role in listing these clearly and succinctly.

For all the media, it is important that sensationalism be avoided and that reporting relies on official sources rather than rumour. Normally law-abiding people who have lost a great deal in a natural disaster often have a lot of hostile feelings and have been known to take the law into their own hands on the basis of unsubstantiated rumour with unfortunate consequences.

Whilst I could be accused of having over-simplified the published theme of my talk "The Media and Community Morale", I suggest that if all media were to adhere in principle to the basic ground rules which I have outlined, it would greatly enhance the changes of community morale being maintained prior to, during, and after a natural disaster.

RESOURCES AND CAPABILITIES
OF THE OUTPOST RADIOCOMMUNICATION SERVICE – CAIRNS BASE

Reginald T. Orr

Introduction

The operational resources and capabilities of the Royal Flying Doctor Service are based upon the principle that in situations of emergency and counter-disaster the Service's role would be to maintain close and effective co-ordination with State Counter Disaster Organization, State Emergency Service, Police and Department of Transport.

This summary of Royal Flying Doctor Service operations is presented in order to establish the area of integration with the other organisations involved in natural disaster and community welfare.

Scope of R.F.D.S. Facilities

The organisational structure of the R.F.D.S. combines the use of medicine, aviation and radio-communication. The geographical areas served by the R.F.D.S. are primarily of low population density of the hinterland. The extensive communication network of the Outpost Radiocommunication Service provides access to medical advice, meteorological information, access to the National telegram facility. The accompanying charts illustrate the location of Bases and associated Outposts. The distribution of the Outposts are generally related to pastoral properties and voids within the National telephone network. (Refer Figure 1.)

The Value and Utilisation of the Outpost Radiocommunication Service for Emergency and Natural Disaster Situations

Historically, the concept of the R.F.D.S. is to provide medical aid and communication to people living in remote areas. This extends into the domain of safety of persons and property resulting from natural disasters.

The natural disaster and emergency situations most likely to involve R.F.D.S. operations pertain to the following:

(a) Major cyclonic conditions resulting in destruction to property, etc.

(b) Flooding of large areas.

(c) Bush and grass fires where there is a threat of life and property.

(d) S.A.R. aircraft and lost persons.

R.F.D.S. operations would be co-ordinated with the Police Department, Department of Transport, State Emergency Service.

Mr Reginald T. Orr: State Radio Supervisor, Royal Flying Doctor Service (Q. Section). Member of Cairns-Mulgrave State Emergency Service; Representative on State Counter Disaster Organization.

Radio Control Station and Outpost Equipment and Licensing

The Outpost Service operates in the high-frequency band of 2MHz to 7MHz. The mode of transmission is now exclusively single-sideband (A3J Upper side band). R.F. power rating is 1 Kilowatt for Control Station transmitters and maximum permissible power of 100 watts (PEP) for Outpost transmitters. Performance and technical specifications of all equipment is type approved under RB209.

The assignment of transmitting and receiving frequencies provide for common channels, viz. 2020 KHz and 2260 KHz, to allow unrestricted intercommunication between Outposts. The two MHz channels are available to the Control Station for night-time communications.

Frequencies in the 4/5/6/7 MHz bands are used for direct communication between Control Station and Outposts. There are exclusively assigned frequencies used for the School of the Air broadcasts. The R.F.D.S. is solely responsible for the equipment and technical supervision of School of the Air.

Outpost equipment is licensed in four categories, viz:

(a) Fixed — Permanently installed at hospitals, homesteads, administration centres.

(b) Portable — Outstations, camp etc.

(c) Mobile — Vehicle installation.

(d) School of the Air — Home or siting of student.

Within the Cairns Outpost network the distribution of Outposts are located as per the attached operation Plan (Figure 2). Licence numbers are given below:

Fixed Outposts	—	241
Portable/Mobile	—	967
School of the Air	—	99

The licensing of School of the Air Outposts requires the student to be enrolled with the Queensland Primary Correspondence Department. The existence of Telecom telephone services presents no restriction.

Radio Control Station Equipment

The Cairns equipment is listed below:

Transmitter (located Mt Haren — Kuranda)

Five single-channel transmitters. A3J, 1000 watts (PEP)

One multi-channel transmitter, channellised for remote channel selection of the following frequencies:

Channel 1	—	2020 KHz
Channel 2	—	2260 KHz
Channel 3	—	5145 KHz
Channel 4	—	5300 KHz
Channel 5	—	5865 KHz
Channel 6	—	7465 KHz

In addition to the above frequency allocation a single-channel transmitter provides the Control Station transmit frequency of 4880 KHz for the proposed Radiotelephone Subscriber Service to a nominated group of Outposts.

Receivers (located off Myola Road)
Seven receivers type 7004. Crystal locked-single channel.
Freq. 2020/2260/5145/5300/5865/7465
R.T.S.S. Rx 4926 KHz.

All aerial systems are half-wave dipoles, feeders co-axial cable.

Systems Lay-out

Control supervision and speech paths between the Cairns (Edge Hill) Base and the remote installations are provided by a 1.5 GHz radio-link system with 12 twelve channel Frequency Divison Multiplex interfacing the H.F. transmitters/receivers and Base communication equipment. The Passive Repeater at Mt Whitfield consists of two 3 metre parabolic antennae mounted back-to-back.

Auxiliary and Standby Equipment

Full provision is available to back-up transmitters and receivers. Auxiliary diesel-alternator plants are located at Mt Haren and Cairns Base. Auxiliary power supplies are automatic start and fuel endurance for no less than 72 hours of continuous run.

A ten-channel, 100 watt (PEP) transceiver, 12 volt battery supply, provides absolute emergency back-up.

Buildings and support structures meet Cyclone Zone Building and Structural Specifications.

Emergency Inter-communication

To meet emergency situations where there is the need to intercommunicate within another Control Station Network, the Base auxiliary transceiver is channellised to give direct contact with Mt Isa and Charleville. Refer Figure 2 for operational plan.

Handling of Emergency Calls During Periods Control Station is Unattended.

The method of handling out-of-hours calls is by means of a selective signalling system. Outposts transceivers are fitted with an encoder that transmits a two-tone signal. Duration of modulated 2-tone transmission must not be less than 15 seconds. To meet day-night guard periods two decoders are time/channel switched. On acceptance by the decoder located at the Control Station, alarms come up in the Duty Radio Officer's residence. This guard facility is referred to as the Emergency-call-system (E.C.S.). The system has a very high order of reliability, thus providing the Outpost Network with a continuous communication service, particularly to handle emergency situations.

Conclusion

The extent of the Outpost Radiocommunication Service provided by Bases of the R.F.D.S., specialised radio engineering and operational experience and related geographic area of operations, places this organisation as being most suited to provide point-to-point communications under situations of natural disaster and emergency.

ROYAL FLYING DOCTOR SERVICE OF AUSTRALIA

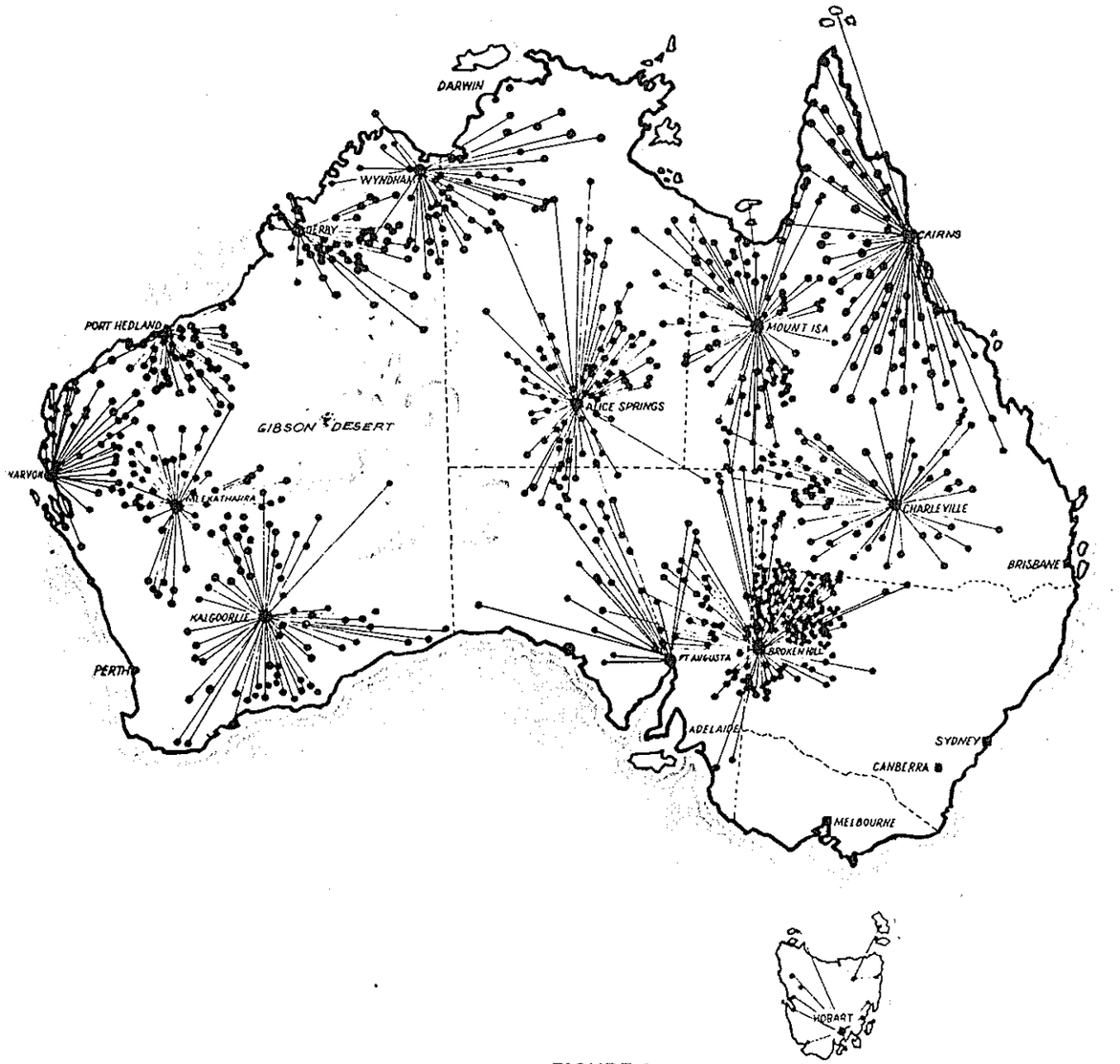

FIGURE 1.

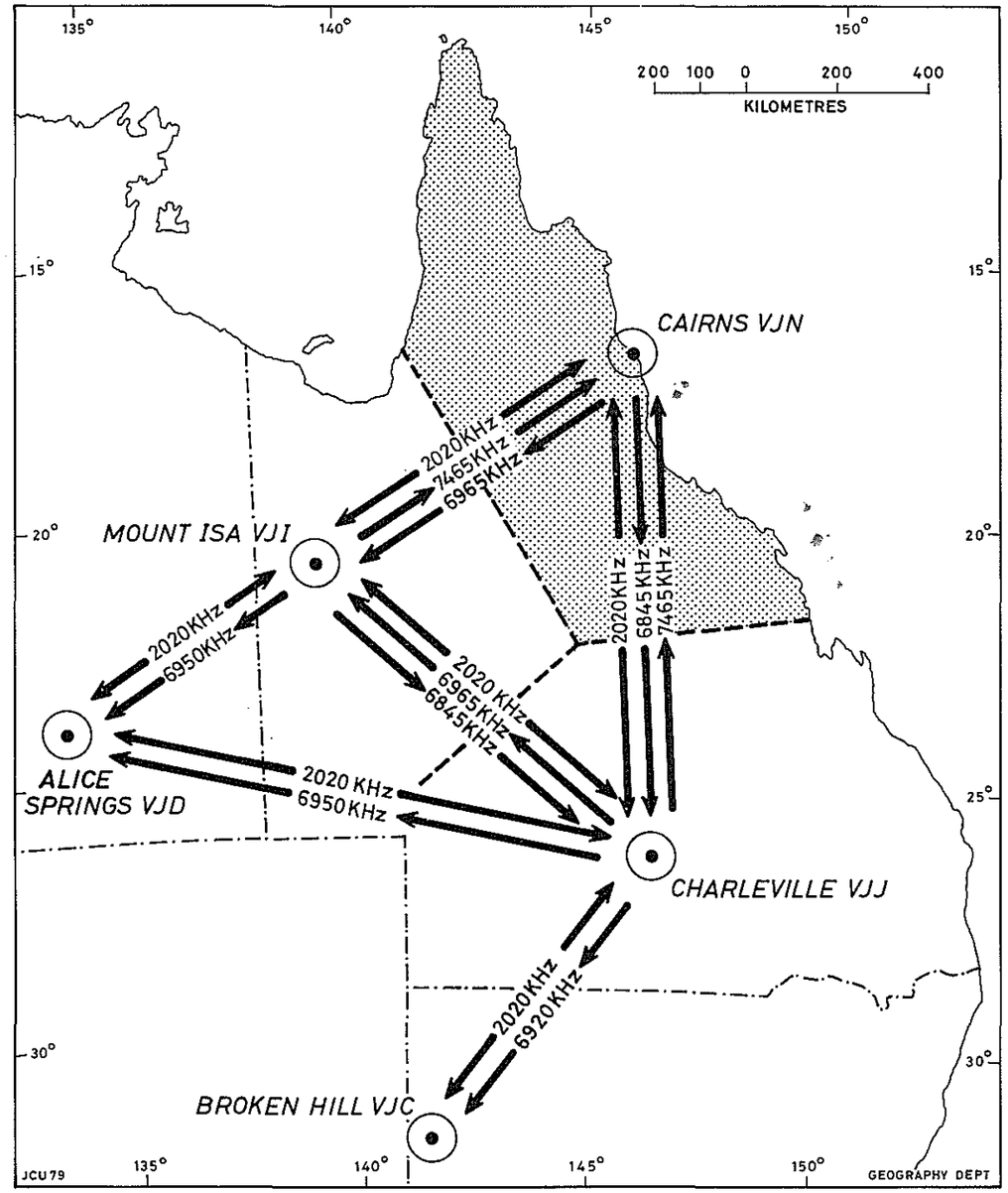

FIGURE 2 — OPERATIONAL FREQUENCY PLAN
Intercomms between R.F.D.S. Base and Cairns Radio Control Area (shaded).

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National Emergency Services College

Communication Seminar — June, 1976, General Report.

ROLE OF LOCAL AUTHORITY IN CIVIL EMERGENCIES, BEFORE, DURING AND AFTER

John Pender

Thank you for the opportunity to participate in your Seminar on Natural Disasters and Community Welfare.

It is in my view most appropriate and timely that such a seminar should be convened by the University at this time and in this area.

We in North Queensland know only too well from the experience of natural disasters in the past, how much at risk our communities are for several months in every year, facing repetitive and real threats of cyclone or flood or tidal surge and in fact any combination of these three.

We have to face too, the certainty that there will always be a bigger flood or a more intense cyclone, and with growing populations and increasing built-up areas, greater risks to personal safety, property damage and disruption of normal living.

As you know I come from Ingham, where, within the last ten years, there have been two devastating floods, that of '67 and '77. The district has a history of flooding, and goes back to the first one in 1927, when some 40 lives were lost. There was immense property damage. Successive floods in '47 and '67 and '77 all have their damage and hardship. I think each one has been mitigated to a large degree by the greater amount of community awareness. We cannot stop the floods: we have got to learn to live with them, and plan to live with them. It is in relation to the latest, March 1977, that I want to make some comments.

That flood can be taken as a typical situation — one likely to recur at any time, and towards which our planning and organisation in Ingham is orientated.

My assignment is to speak on the role of Local Authority in Civil Emergencies before, during and after, and everyone of these phases is of great importance.

Perhaps it is proper to say that the need for effective participation of the Local Authority, is greatest in the pre-disaster and post-disaster stages rather than during the actual emergency, although it has still a very active part to play then in the time of crisis.

Whilst the emergency situation exists, it has been my experience that the community generally acts spontaneously in a large measure. People take individual and collective action to protect themselves and their property whilst statutory bodies such as Police, the forces, and State Emergency Service, perform their allotted tasks.

Mr John Pender: Shire Clerk, Shire of Hinchinbrook. Immediate Past Federal President of the Institute of Municipal Administration; Queensland President of Institute of Municipal Administration, 1975 and 1976. Forty-two years in Local Government. Local Controller, of State Emergency Service, (Hinchinbrook Shire). Involved in counter-disaster and restoration of the Ingham Community after the Ingham Floods of 1967 and 1977. Hinchinbrook Shire Council Representative and President of Interim Committee of the Regional Council for Social Development.

It is in the planning monitoring and warning stages before the crisis, and in the relief, rehabilitation and restoration stages afterwards, that the Local Authority is largely left to function alone at local level, and if it does not perform effectively then much unnecessary damage and distress can result.

Counter-disaster planning is a duty imposed on the Local Authority by Statute. The State Counter Disaster Organisation Act of 1975 places a high onus of responsibility upon each Council.

The Act categorically requires that each Local Authority shall:—

(a) prepare a local counter-disaster plan to deal with all counter-disaster measures within its area;

(b) establish, and at all times maintain within its area a local emergency service based upon resources of Local Authority and consisting of volunteers, with such advisory committees, units and services, as the Minister considers necessary or desirable;

(c) to use, as prescribed, or so far as not prescribed, as the Minister determines, for counter-disaster purposes, its resources and other resources made available to it for those purposes.

So that you can see that the Local Authority is charged with a high onus of responsibility and the task which, if it does not face up to, leaves people in very dangerous circumstances. I mentioned earlier the spontaneous actions of people to help themselves: this occurs very readily and as you saw in the film earlier unless those efforts are co-ordinated and directed, you can get a high degree of ineffectiveness and in fact, some degree of danger.

The preparation of a counter-disaster plan is in itself a task of considerable magnitude in both the initial creation and in the revising and the refining that is most necessary as a continuing process.

It involves not only the documentation of a broad overall plan specifying aims, roles and tasks of local bodies and organisations but it also has to have supporting it, individual plans in detail by those other bodies. The Local Authority has, too, in most cases, to motivate those bodies to act. It has to prepare such a plan for its own organisation.

Perhaps this is an opportune time now to make the point that whilst a local authority is under a statutory duty to use its resources in counter-disaster measures, it still has a very large and important duty to continue, as best it can during a disaster, its normal community services; it has to keep water supply, sewerage, roads, public health etc., functioning and to speedily restore these services if they fail.

There are very real advantages in the personnel of Local Authorities having defined roles in the State Emergency Service, and I know from my own experience how useful it was for me in March 1977 to have the dual offices of Shire Clerk and local Controller. It is terribly easy for me to put on my Local Controller's cap and ask the Shire Clerk for some degree of service, and then to put on my Shire Clerk's cap and say yes. Again I stress that there is a great deal of efficiency to be gained in such overlapping or perhaps dual filling of that role. There has to be a rationalisation between the personnel demands of the State Emergency Service in performing its task, and the Local Authority in performing its task.

There is also a basic problem in that people in the time of disaster have personal responsibilities to their families, homes and property, and there is often some degree of difficult decision-making and hardship in equating their private and their official commitments.

It is not easy in time of disaster to leave your family to fend for themselves while you

go and care for others and perhaps see them three days later. This is an individual problem that people in the State Emergency Service face in their own private life.

I mentioned earlier the pre-disaster role of the Local Authority. Apart from planning which I have said something about, the other important issue is that of monitoring threat conditions, and having the informed capacity to do this and to make proper assessments, and to provide public information.

We have of course the very valued services of the Meteorological Bureau but these have to be supplemented at local level.

For instance the Hinchinbrook Shire Council has a quite extensive and proven effective, system of river height and rainfall reporting stations feeding in information on a pre-arranged time/quantity schedule.

From this we are able to give predicitions of river heights and times at local points, based on the known river heights and rates of rise, rainfall history, and rainfall predictions fed to us by the Bureau. Here again I point to the Local Authority as being a useful source of information because people in Local Government are perhaps more stable and stay in a town. You will find a very large fund of useful information from people serving in Local Government. Knowing the local situation is terribly important in time of disaster. Quantitative statements are also made regarding the effect that certain heights at the Ingham gorge will produce in certain parts of the town.

Warnings are disseminated by national and commercial radio messages, by T.V., and by display on public notice boards.

There is also a reference sheet published in a newspaepr with copies circulated on a wide basis. This enables people to interpret what a particular river height means in terms of flood effect.

There is a very great need for up-to-date and easily interpreted information to be available. The most technical information might be academically very correct, but unless the man in the street can interpret it, it is pointless. Statements have to warn but not frighten unnecessarily, and it is always a problem to make this distinction. It is always a problem too, to counter the rumours and incorrect "talk in the street" messages that are always present when a situation is developing. People always seem to hear and heed these rather than the authoritative ones.

It is not only local people who have to be warned and advised. Outside organisations that may be involved require a proper awareness so that they can act as and when required, and ordinary people in other places need to know what is happening to families, relatives and friends, or what is expected to happen.

And in emergency time, as happened in the situation in 1977, it is necessary to have such an Information Bureau that can take the calls from the people from outside centres who have friends and relatives in the crisis area, so they can be told what the situation is and what is happening to Mary James or Tom Smith.

New comers to a risk town need to be made aware of the hazards so that they can do something about them at an early stage. Property damage can be minimised or avoided by the Local Authority insisting upon safe siting and construction standards for buildings.

In the case of my Council, we have insisted for many years, and well prior to the recent introduction of Standard Building By-Laws, on high standards of building construction. We have set safe floor heights for public and multi-family residential buildings in the flood-prone areas, and offer an advisory service as to flood effects to all owners, builders and developers, agents, surveyors, solicitors and the like.

A map showing inundation levels has been produced by our own survey staff and is widely distributed. This was prepared by Council surveyors using flood levels recorded by householders as the result of requests made by radio and press announcements, and we received good co-operation. It is amazing how the flood height varies from part to part. Those are some of the things that the Local Authority does in the pre-flood situation.

I want to turn now to the post emergency situation, and this is the heartbreak time for people returning to the wrecks of homes, property which is lost, rooms full of mud and generally the situation we saw on the film a while ago. This is a pretty traumatic experience. This is the time when Local Authority has got to face the immediate need of restoring reasonable living conditions in quick time, and by reconnaissance to assess the overall imput of relief and rehabilitation measures that are required and the external support needed to match that requirement.

The Local Authority has a major role in play in this as an assessor, initiator, co-ordinator and provider of service.

By service, I mean such things as money for immediate needs, food, clothing, shelter, cleaning, debris removal, individual and public property restoration, counselling and assistance for emotional and social problems.

Some of these things the Local Authority can provide itself out of its own resources, but certainly not all. For the things it cannot do itself, it has a clear duty to ensure that the gaps are filled by others or other organisations.

Many people play an active part in this very usefully, particularly the voluntary welfare agencies, organizations such as the Red Cross, Salvation Army, Churches and service clubs who step in as soon as the crisis is passed and do a very great task. But the role of the Local Authority continues on long after that. It continues for a period after the disaster has ceased to be news or to generate popular support.

We all well know, when the emergency situation is on, it is in every paper and on everybody's lips, but as soon as the rain stops and the wind blows, or some dramatic event happens elsewhere, it is no longer news, it is no longer talked about. This is the time that the Local Authority has to come in very carefully and take a great deal of responsibility. It is no longer a popular issue and there is no longer support coming from external sources.

One of the deficiencies which became obvious to me in the aftermath of the 1977 floods was the lack of counselling services for people with emotional stresses and of advice for those with personal problems. In a town like Ingham we do not have a Social Worker at all. After 1977 reports filtered in about people who were emotionally disturbed and who were living in absolutely intolerable conditions but did not know where to go for help. It is hard to find these people in a community. They are hesitant to come forward — in some cases they do not know who to go to — and the problem grows because they cannot share it nor obtain relief. Each disaster area needs to have an organisation to operate for quite a long time after the actual event, because many of the problems take quite some time to emerge, and are often not eased until after repetitive and continuing action. Unfortunately in a town like Ingham, the service doesn't exist. We were greatly helped in 1977 by the Department of Children's Services who sent a Social Worker, Alan Mitchell, from Townsville at our request for a number of weeks. But one day a week for 4 or 5 weeks is not nearly enough and there remains a very marked deficiency in our organization of emotional and welfare services.

We who live in the smaller country communities are in my view, better able to cope with disaster situations than those in the large cities. Life is more personalised, people who are not anonymous know and help each other more; there is a more intimate knowledge of conditions and local facilities; there is a greater individual capacity for self-help and people generally are more resourceful and more resilient.

I don't say this in any derogatory sense, but I believe it is quite factual that country people always have had to fend for themselves most, and are more adaptable and inventive as a result, and therefore they have been able to bounce back quicker and more effectively, than people who did not have that same background and way of life. Certainly this has been my impression over the years, and I know from my Army days that it was the recruits from the country who developed the quickest into good soldiers.

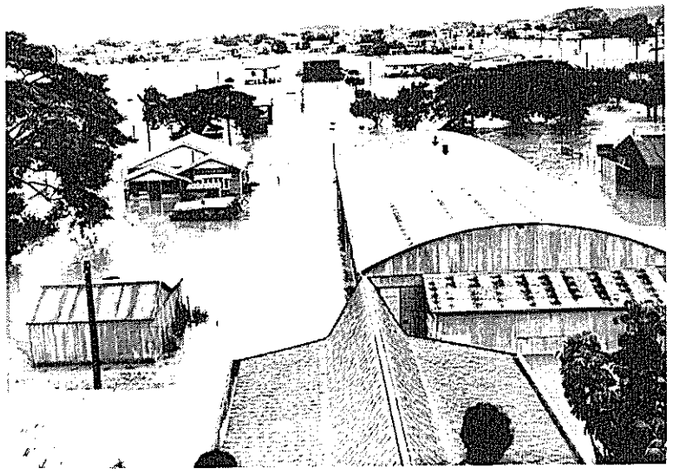
Finally I want to say that I see it as very necessary for a Local Authority to stimulate and support its local State Emergency Service. If it does not do so it is guilty of irresponsibility and a very grave disservice to its people. It has to give its counter-disaster obligations equal priority with other essentials such as water, sewerage and roads.

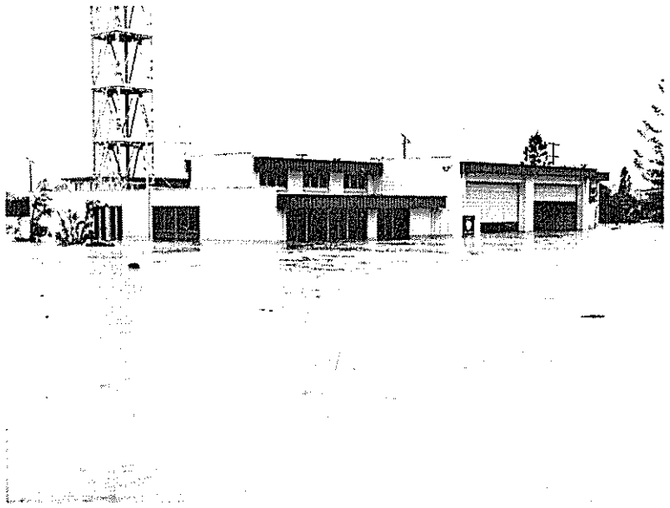
I hope that in quite good measure we have done this in Hinchinbrook and would like to quote the editorial in the Herbert River Express of 12 March, 1977. "A new name has been added to our local vocabulary — and it is a name which can be used with pride. The name is 'State Emergency Service' — the S.E.S. The work which all sections of the local S.E.S. performed in the local emergency situatuion of this week has been outstanding. The level of co-ordination and involvement at all levels, coupled with the opening of avenues under the declaration of the district as a Disaster Area under State of Emergency provisions, has placed the district possibly weeks ahead of the situation which has applied after the 1967 flood. All associated with the S.E.S. from its Director and Co-ordinator down are deserving of the highest community praise. A disaster has been coped with, and within a day of its ending the district is coming back to vibrant life."

I was asked at a debriefing session to make a comment and I think I described the situation well. What I said of the S.E.S. was that we had met and coped with a bad time. We hadn't been very efficient but had been very bloody effective.

Ingham Floods: 1977

(Photographs: Courtesy Hinchinbrook Shire Council)





Ingham Floods: 1977

(Photographs: Courtesy Hinchinbrook Shire Council)

A FLOOD HAZARD CASE STUDY : INGHAM, NORTH QUEENSLAND, 1977

Kevin Frawley

The town of Ingham (116 kilometres north of Townsville) is the centre of an important sugar producing area based on the Quaternary alluviums of the Herbert River floodplain and delta. The 340 km long Herbert River has its source in the Wild River near Herberton on the Atherton-Evelyn Plateau (Figure 1). Flowing southward, the river is joined by the Millstream, Blunder and Cameron Creeks draining the western slopes of the Cardwell Range and Rudd Creek and its tributaries flowing eastward from the flatter slopes of the Great Dividing Range. Downstream from Gleneagle the river is funnelled through a steep sided gorge (rising on average 500 metres above the stream bed) before flowing across the coastal plain. Short tributaries such as Blencoe and Yamanie Creeks join in the gorge section. On the coastal plain there are a number of tributaries including the Seymour and Stone Rivers as well as streams flowing to the sea which receive overflow discharge from the Herbert.

Flood periodicity

Major destructive floods in the area during this century have had a return period of about ten years while lower flows still in excess of the channel capacity have occurred once in six years (Figure 2). This flood periodicity is derived from only a 62 year record with the Irrigation and Water Supply Gauging Station at Ingahm operating from 1915. Glen Eagle records date from 1922 but all others are for much shorter periods (McIntyre Report, 1975, 11).

Area affected by flooding

During major flood flows, flooding occurs from slightly upstream of Herbertvale with Herbertvale, Abergowrie, Long Pocket and Trebonne being the most susceptible areas. The major inundation occurs in the lower reaches where almost continuous surface flooding may extend for 25 km (north to south) in the vicinity of Halifax (Figure 3). The flood prone area is contained within Hinchinbrook Shire which had a 1976 population of 13,974 of which 6,300 lived in Ingham.

Flood monitoring, prediction and warning

Flood warnings for the Herbert River as for other Australian rivers are the responsibility of the Bureau of Meteorology, in addition, the Herbert River Improvement Trust and some privately serviced stations provide supplementary flood data (McIntyre Report, 1975, 40). Flood levels and rainfalls in the catchment and floodplain are monitored by a system of river gauging stations, flood warning and rainfall stations as well as a special network of heavy rainfall reporting stations. Mt Garnet, Ravenshoe, Gunnawarra, Gleneagle,

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Mr Kevin Frawley BA (Hons) *W. Aust*

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Abergowrie Bridge, Upper Stone and Ingham are heavy rainfall reporting stations within the Herbert catchment (Figure 1). Ravenshoe, the most distant of these provides up to 30 hours warning of flood flows at Ingham while Gleneagle river flood warning station provides 18-20 hours warning. Though they may contribute significantly to flooding at Ingham, coastal range tributary flows including Stone River are unmonitored. There are a number of other deficiencies in the present flood monitoring and warning system, including poor communications (see McIntyre Report, 1975, 42). One important aspect of flood warning is the distance separating most flood generating rainfalls in the upper catchment from the floodplain area affected. Ingham may be experiencing fine weather or only light rain while heavy falls occur in the upper catchment. This occurred in 1967 and as a result, there was generally poor community recognition of the flood danger. In 1967 seventy-two hour rainfalls to 14/3/67 were 500 to 600mm in the upper catchment, about 400mm at Abergowrie, 300mm at Long Pocket and 125mm at Ingham (Way, 1978). Rainfall in the Stone River catchment was similar to that received in Ingham therefore it did not contribute significantly to the flood volume. In March 1977 a major flood occurred following torrential rains from a monsoonal trough which lay from Weipa to Innisfail. This flood resulted from rainfalls of 300 to 400mm over the whole catchment in the 96 hours to 9/3/77. Flood magnitude was accentuated because the peak rainfall periods moved downstream with the flood wave in the river (Way, 1978).

Flood effects

The effects of flooding may be conveniently divided into:

(i) the loss of, or damage to, physical objects and structures including livestock and crops; and

(ii) loss of life, injury, upheaval and stress to residents.

The Herbert floodplain has been extensively cleared of natural vegetation and sugar cane is grown to the river bank, on lower level terraces and across natural levee banks. Farmers growing valuable sugar crops in these very flood prone areas may be seen as 'environmental gamblers' playing against an uncertain environment where the gains in non-flood years are expected to exceed flood losses. Bank erosion, overbank scour, debris and silt deposition are significant and occur even at low flood flows causing loss of or damage to land and crops. Bank erosion has probably been accentuated by the practice of clearing to the very edge of the river banks and bank slumping is common. Other major rural losses or damage occurs to livestock, ponded crops, farm structures and machinery, sawlog stocks, timber milling plant and equipment, public utilities and sugar milling infrastructure such as tramlines. While no detailed survey exists the 'Townsville Daily Bulletin' 11/3/77 reported that 75% of the 1800 houses in the Ingham town area suffered some damage in the 1977 flood.

There are many difficulties in accurately calculating the costs of losses and damages. For example, trading losses (due to stores being closed during the event) will be at least partly compensated for in increased purchases afterwards, some being simply delayed or redirected. Though of poor consolation to the stricken individual (especially the under- or uninsured), there is good evidence that a disaster may bring about increased economic activity as well as other non-economic benefits (see also Oliver, 1977, 14).

Flood costs in the Ingham area have been estimated for seven major floods from 1927 onwards at more than $20 million (Table 1). Loss of life has varied from 21 in 1894, 25 in 1927 and one child electrocuted by fallen power lines in 1977. In 1967 there were many near fatalities with loss of life being avoided only by the use of boats, amphibious vehicles and helicopters (McIntyre Report, 1975).

Table 1. Schedule of costs for major Ingham floods 1927-77

Year	Estimated Cost
1927	$2,500,000
1934	$1,500,000
1940	$2,000,000
1946	$2,000,000
1955	$1,500,000
1967	$5,700,000
Total estimated losses (1971 values)	$15,200,000 (1)
1977 (1977 values)	$4,900,000 (2)*

Sources: (1) McIntyre Report, 1975
(2) Hinchinbrook Shire Council

* This figure includes $2,879,032 for the sugar growing industry of which $1,855,407 was for crop loss.

The following are figures from newspaper reports during and immediately following the event.

(a) 'Townsville Daily Bulletin' 11/3/77, (same item):

'. . . . damage estimated at more than 7 million'.

'. . . . it was still too early to estimate flood damage' but it was estimated to be 'on a par with the last major flood in 1967 which had cost the Ingham district $6.5 million'.

Editorial

'The damage to the Herbert River district sugar crop is expected to top $20 million. Damage to property and roads in the district will run into many more millions of dollars'.

(b) 'Townsville Daily Bulletin' 12/3/77:

'. . . . between six and seven million dollars at least'.

Community response to flooding

In June 1977, three months after the floods a questionnaire survey was carried out in Ingham, with the aim of investigating 'the effects of flood hazard on the Ingham town and surrounding community'. The actual field work was carried out as a first year student field excursion. The number of interviewers (70) allowed a very large sample (approx. 700) from all parts of Ingham as well as Trebonne and Halifax (Figure 1). A written questionnaire was administered containing both open and closed questions (Appendix 1). Following on from the basic aim as previously stated, four specific objectives were defined:

(i) to establish why occupancy of flood prone areas persists;
(ii) to examine how the threat is perceived by residents;
(iii) to compare the range of possible adjustments with those the individual perceives as being available;
(iv) to find out how natural hazard stress compares with other stresses e.g. economic conditions.

As a starting point for the survey and more specifically to form a basis for the questionnaire, broad, general hypotheses were considered, based on those outlined by

White (1974, 4-5). Perhaps the most fundamental of these is that 'rational explanations can be found for the persistence of human occupance in areas of high hazard by examining the perception of the occupants of such areas and searching out their views of the alternative adjustments and the likely consequences of adopting any one of these opportunities' (White, 1973, 209). In line with the aim, objectives and the major hypothesis, five supporting hypotheses were considered and these will be discussed subsequently. These hypotheses were:

1. (a) *The longer the period of occupance in the district the greater will be the perceived threat;*
   (b) *Perception of the threat will vary directly with the number of times a household has been flooded.*
2. *Rational reasons exist for continual occupance of a flood prone area.*
3. *Residents will perceive technological adjustments as the most practical to alleviate the flood problem.*
4. *Individuals will perceive a much narrower range of adjustments than are actually possible.*
5. *The flood hazard will not be seen as a significantly greater difficulty in life than other problems e.g. economic, social, familial ones.*

These broad hypotheses are not seen as statements of relationships that have been rigorously tested in the survey rather they provided an *a priori* ordering for the enquiry. The study might best be seen therefore as an extensive pilot survey.

It has been postulated, as in the major hypothesis considered above, that 'rational reasons' exist for continued occupance of flood prone areas. The notion of 'rationality' in decision making has been fairly extensively debated elsewhere (see for example, Simon, 1957; Kates, 1970; White, 1973). The result has been that rationality in the choice-searching process must be interpreted as referring to a broad spectrum of considerations important to individual well being which are weighed in considering alternative locations. Reasons may have, for example, a familial, cultural, social or economic basis and be affected by personality, information, the decision situation (whether collective or individual and under what constraints), as well as managerial role.

The number of times a household has been flooded and period of residence in the Ingham area appear to have no influence on how the flood threat is perceived. Seventy to eighty percent of all interviewees perceived the flood threat as serious or very serious in each of the residence and 'times flooded' categories (Tables 2 and 3). This conclusion probably reflects, in part, the timing of the survey — three months after the event which would have been experienced by all residents except the most recent arrivals or those absent from the area. Different results might be expected through time. This relationship between hazard experience and perception, periodicity and human adjustment has been explored elsewhere (see for example, Burton *et al.*, 1968).

Table 2. Ingham residents' perception of the flood hazard related to years of residence

Flood Hazard * (%) / Years of Residence	Very Serious	Serious	About Average	Low	Very Low	Row % of total respondents N = 700
<5	37	37	21	3	2	17
6-10	27	49	18	5	1	12
11-20	34	42	23	1	0	22
>20	35	41	21	3	1	49
						100

*Percentages are rounded to nearest whole number (rows may not total 100%).

Table 3. Ingham residents' perception of the flood hazard related to the number of times households have been flooded.

Flood Hazard * (%) / No. of times flooded	Very Serious	Serious	About Average	Low	Very Low	Row % of total respondents N = 700
Nil	31	47	21	1	0	31
1-2	34	40	23	3	1	48
3-4	39	39	20	1	1	12
>4	38	39	21	2	0	9
						100

*Percentages are rounded to nearest whole number (rows may not total 100%).

The single simple question on perception of flood severity provides a guide only to what are complex and changeable feelings regarding flood danger. More detailed exploration of this aspect would require further questions with some serving as cross checks, and preferably, support from appropriate less obtrusive measures (e.g. the nature of adjustments undertaken may provide some assistance here). The first joint hypothesis was therefore not supported:

1. (a) *the longer the period of occupance in the district the greater will be the perceived threat;*
   (b) *perception of the threat will vary directly with the number of times a household has been flooded.*

Seventy percent of all respondents have been flooded one or more times, and 20% three times or more. For 48% of all respondents floodwaters had actually entered the house (including underneath areas of high set houses), for some 9% more than three times. These figures demonstrate the extent to which residents are flood prone and 13% of total respondents had moved from another part of Ingham at some time because their previous household had been flooded. Responses to the closed question [5(b), Appendix 1] giving a range of reasons for not moving address are shown in Table 4. These results give some support to the second hypothesis: *rational reasons exist for continual occupance of a flood prone area.* In the first instance, many residents (possibly 40 %) now live in areas above the major flood heights or in areas where water was less than about 0.5 metre deep.[1] Secondly, if as Kates (1970) suggests, we see natural hazards as but one of the concerns affecting hazard zone dwellers the responses in Table 4 are rational reasons for continued occupance. The importance of family and friends stands out clearly.

Within the limited scope of this study it was not possible to ascertain the number of people (if any) who may have left the town predominantly because of the flood threat.

Table 4. Reasons for not moving address ('flooded ' households only, Q5 [Appendix 1]).

Moved address ?		N = 492
Yes	18%	
No	82%	
Reasons for not moving address		N = 403

(Note: (1) more than one response possible;
(2) some respondents did not indicate any category.)

[1] Slight variations occur in flood heights e.g. in 1977, heights on the northern side of Ingham were slightly above those in 1967 and lower on the southern side.

	% of respondents
Could not afford cost of moving	17
Better off here than in another town	20
Probably could not get work in another town	7
Family and friends here	33
Chances of another big flood coming are small	8
Returns from land in good years make up for the occasional flood	3
Other (included responses 'no reason to shift', 'stabilized here at present', 'no other home available', 'not serious enough to move')	8

Increasingly, the response to natural hazards has been for societies to move towards technological solutions. This appears to be the case, with qualifications, for the Ingham community with 47% of respondents suggesting forms of flood mitigation works as a long term solution in response to an 'open' question[Table 5(a)]. The nature of these modern technological or industrial adjustments involving a limited range of actions mainly designed to modify the event have been discussed elsewhere (see White, 1974; Arnold, 1975; O'Riordan, 1971, 88). The results in Table 5(a) support the hypothesis that: *residents will perceive technological adjustments as the most practical to alleviate the flood problem.*

Table 5(a) Respondents' suggestions as to 'the best ways of doing something about the Ingham flood problem' (Q6, Appendix 1)

(b) Individual adjustmetns carried out (Q7, Appendix 1)

Response categories	(a) % of all respondents – 'best ways'	(b) % respondents who indicated individual adjustments
Purely technological adjustments – to modify the flood (e.g. flood protection works – dams, levees; weather modification)	47	22
Land use management – to modify the flood (e.g. changed cropping practices, gully control, revegetation, catchment forest fire control)	5	4
Modify susceptibility to damage – modify the use (e.g. land use regulation and zoning, subdivison control, raised buildings, use of impervious building material)	20	62
Modify (lessen) burden of flood losses (e.g. flood insurance, disaster relief, evacuation of persons and property)	4	18
Do nothing – bear the loss	23	N/A
Other	7	7

(a) N = 700 respondents. The number of responses was slightly more (738) as some residents indicated more than one way.

(b) N = 174 respondents who indicated individual adjustments (25% of total respondents). The number of responses was slightly more 197 as some residents indicated more than one adjustment.

The call for major engineering works on the river has not been a strong one at this stage. The question of a Herbert River dam has been raised periodically and as might have

been expected appeared after the 1977 flood ('Townsville Daily Bulletin' 11/3/77). There is general uncertainty about what sort of works would be possible and no co-ordinated agitation for such. In the floodplain area, significant rock wall bank protection works, bank battering and grassing as well as island clearing have been carried out under the auspices of the Herbert River Improvement Trust. On a local scale there are a number of agricultural drainage schemes being implemented or planned and some farmers have carried out private flood mitigation schemes including levees and drainage works (McIntyre Report, 1975).

The fourth hypothesis stated: *individuals will perceive a much narrower range of adjustments than are actually possible.* There were difficulties in interpreting the results from the question (Q7, Appendix 1) relevant to this hypothesis because of the constraints (especially financial) which limit the individuals choice of strategies, even though a range of alternatives may be clearly perceived. In consequence, no conclusion has been drawn for this hypothesis. Twenty-five percent of respondents have carried out some individual adjustments especially those designed to modify damage susceptibility [Table 5(b)]. Many residents have raised low set houses, however the use of concrete blocks appears unsuitable for enclosing the underneath of high set houses in flood prone areas as they are easily damaged by water, leading in some cases to collapse (as occurred in 1977, see for example, 'Townsville Daily Bulletin' 11/3/77). It is of note that collapse of masonry appeared to be a major cause of death due to structural failure in Cyclone 'Tracy', Darwin 1974 (Walker, 1975). Urban hydrology is important here also, as the building of concrete block walls or fences and the enclosing of high set houses diverts water flow paths sometimes to the detriment of neighbours. Some examples of individual adjustments include the following:

(i) boats purchased specifically for evacuation purposes;
(ii) power points high on walls;
(iii) furniture on legs or higher than normal legs;
(iv) high shop stock shelves;
(v) tiles replacing carpets in a motel;
(vi) farm houses on raised earth formations carted from elsewhere.

The fifth hypothesis: *the flood hazard will not be seen as a significantly greater difficulty in life than other problems e.g. economic, social, familial ones*; was an attempt to rate the stress caused by the flooding. The question and the results (which provide support for the hypothesis) are only an elementary exploration of the relationship between the hazard event and stress. The flood problems is treated very similarly to three of the four other comparative 'difficulties' (Figure 4). The exception is 'Isolation of the north from the rest of Australia'. Flooding causes a high stress peak for a short period of time, its magnitude depending on the level of threat to life and property. During the 1977 floods the risk of loss of life or serious injury remained fairly low compared to previous occasions and this situation is likely to continue. A realization of the emotional distress felt by some residents during and after the event led to the temporary appointment of two social workers by the State Government in 1977. With previous floods there had been lack of social welfare backup, especially in the recovery period when the event had left the headlines and even the assistance provided in 1977 may have been insufficient (Pender, 1977).

Ingham residents have come to accept the flooding as a fact of life with some individuals carrying out adjustments as previously mentioned. This situation has been described as one of 'active acceptance'. It may well be that the periodicity and magnitude of major floods as determined from the records so far are insufficient to engender agitation for major flood mitigation works (a likely response should this threshold be passed). Despite the physical losses in the flood disasters, there is a strong suggestion that they provide the community for a short time with a sense of purpose and solidarity. This was summed up well by an Ingham police sergeant who stated during the flood, 'There's a great feeling of comradeship in the town and everyone is working to a common goal' (Townsville Daily Bulletin 10/3/77). The result may be to promote and further strengthen friendship and

family ties in a cohesive community in which many residents are of Italian origin. Similar findings have been noted elsewhere (see for example Drabek and Boggs, 1973; Drabek and Key, 1976).

Discussion

In 1977, Ingham was undoubtedly the best prepared it has ever been for a major flood. The 1967 flood experience had heightened community awareness providing the motivation for greater future preparedness. Adjustments undertaken have been mainly in the areas of (i) modifying damage susceptibility and (ii) modifying the loss burden (see Beyer, 1974). The local sections of the State Counter Disaster Organisation and State Emergency Service are active and effective at the present time and they are supported by the Hinchinbrook Shire Council. They are also able to call upon a range of other support services (e.g. RAAF) during a disaster event. The Shire Council has gained a good deal of experience in the most effective ways of avoiding disaster and alleviating hardship. The present town plan which came into existence after the 1967 floods includes 'Special Flooding Zones' in which flood susceptible uses are prohibited. Those permitted are agriculture, animal husbandry, outdoor entertainment, recreation and some special uses (mainly of an 'instrumentality' type). Fortunately, in the past, few people had actually built houses in these zones. The Shire Council also operates a flood information services.

On the preceding section a number of aspects of the way Ingham residents perceive major flood events and the 1977 floods in particular have been discussed. Another point worthy of note is that residents have developed a range of 'hypotheses' regarding flood severity, characteristics and solutions. The 'explanations' might be seen as means by which residents reduce or eliminate uncertainty regarding the hazard. In some cases responsibility is simply transferred — for example, to the Shire Council for certain water-flows or to upstream miners for silting. These 'folk hypotheses' are part of what Knight (1971) refers to an 'ethnogeography' this being 'a society's perception of the environment of which it is a part, its understanding of natural and cultural processes which create spatial patterns' (p.48). Local perception of environment expressed through the development of 'folk knowledge' and 'folk classification' of local phenomena may lead to beliefs about the environment which directly contradict rational scientific knowledge. The role of this 'folk science' has important implications for decision making in resource management [see Murton, 1972; Kasperson, 1969(a), (b)]. The debate in 1977 over the John Row bridge (on the Bruce Highway over the Herbert River) is a good example of 'folk hypothesis' development and its use to explain or reduce uncertainty regarding environmental changes. The bridge (a high level concrete structure) was build in 1968 and 1977 was the first time it had been exposed to a major flood.

Many local residents especially some nearby cane farmers argue that the bridge acted like a dam, blocking waterflow, causing erosion on nearby cane farms and leading to the different flood depth pattern from the 1967 flood. These farmers claimed that the bridge should have been built two metres higher to allow flood waters to escape and the closest farmer stated that he had lost 20 acres of cane because of the 'bridge blunder' (Townsville Daily Bulletin 14/3/77). Counter views have little sympathy for farmers who 'grow cane right to the edge of the river bank without leaving any buffer zone of bush' (Anon., 1978). Having established the 'folk hypothesis', supporting evidence is sought in like experiences (from other farmers who suffered damage and townspeople). Considerable support has been gained for the 'bridge blunder' hypothesis in the town despite engineering advice to the contrary. In a carefully documented report to the Council the Shire Engineer has indicated that the measured head loss through the bridge structure was 0.1 metre dissipating in a short distance downstream. A raised railway embankment, land filling and subdivision are indicated as two features affecting flood heights in 1977 (Way, 1978). With the 'folk hypothesis' having apparently been verified by public consensus a predication has been made that the new Halifax bridge (Figure 1) will cause similar problems. Whether better information and its dissemination will break down what some may see as local ignorance is uncertain but a gap does exist between the professional resource managers and many local residents in their perception of events.

Conclusion

The main conclusion that can be drawn from this exploratory survey is that due to the solidarity and cohesiveness of the Ingham community, it exhibits a good deal of resilience in the face of recurring disaster. In turn the disaster event itself appears to reinforce this solidarity. The stability of the community would probably mean that results obtained in Ingham would not be readily generalized or be replicable elsewhere especially in other less stable northern Australian communities.

Large scale flood mitigation works are unlikely to be undertaken on the Herbert River in the foreseeable future, though agitation for such works would increase if either periodicity or magnitude of flooding increased. Any substantial relocation of the town can probably be dismissed as an adjustment option, though some individual household relocation has occurred. Response to the flood hazard will therefore continue to involve —

(i) small and local efforts to modify the flood — as in drainage and levees;

(ii) planning to modify susceptibility — as in high set houses and relocation;

(iii) modification of the loss burden — as in disaster relief and emergency services; and,

(iv) a certain amount of doing nothing.

Acknowledgments

The assistance of 1977 first year Geography students' survey work and field reports is gratefully acknowledged as are the comments of Professor J. Oliver who reviewed this paper.

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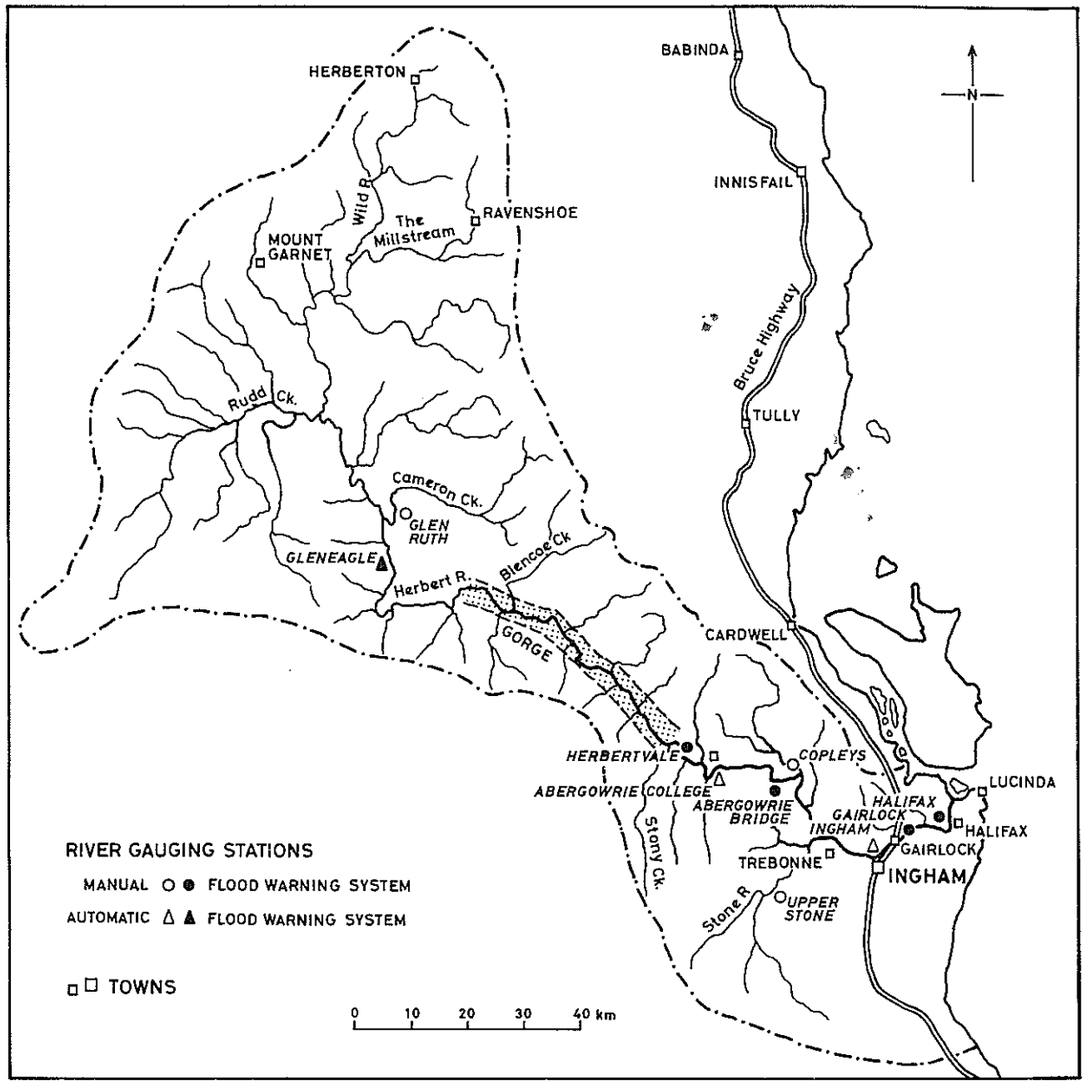

Figure 1. Herbert River Catchment Area
(Source: Frawley, 1978)

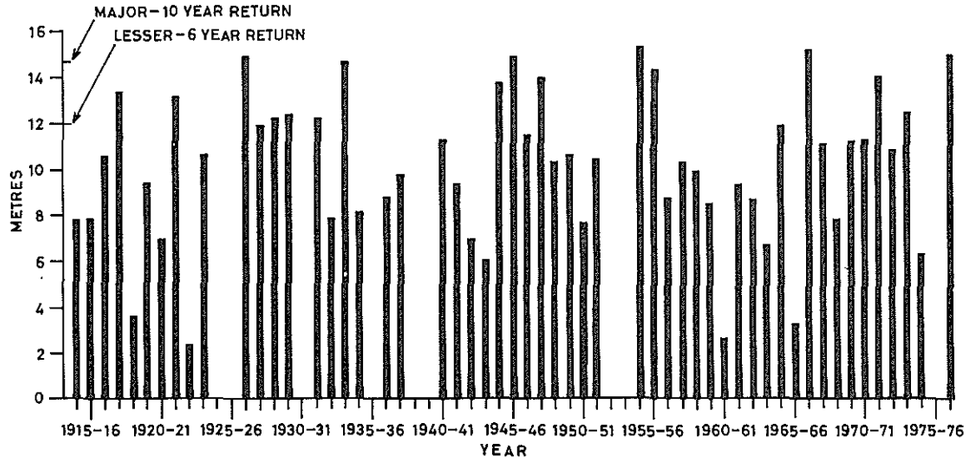

Figure 2. Herbert River at Ingham – river heights 1914-15 to 1976-77.

(Source: Frawley, 1978)

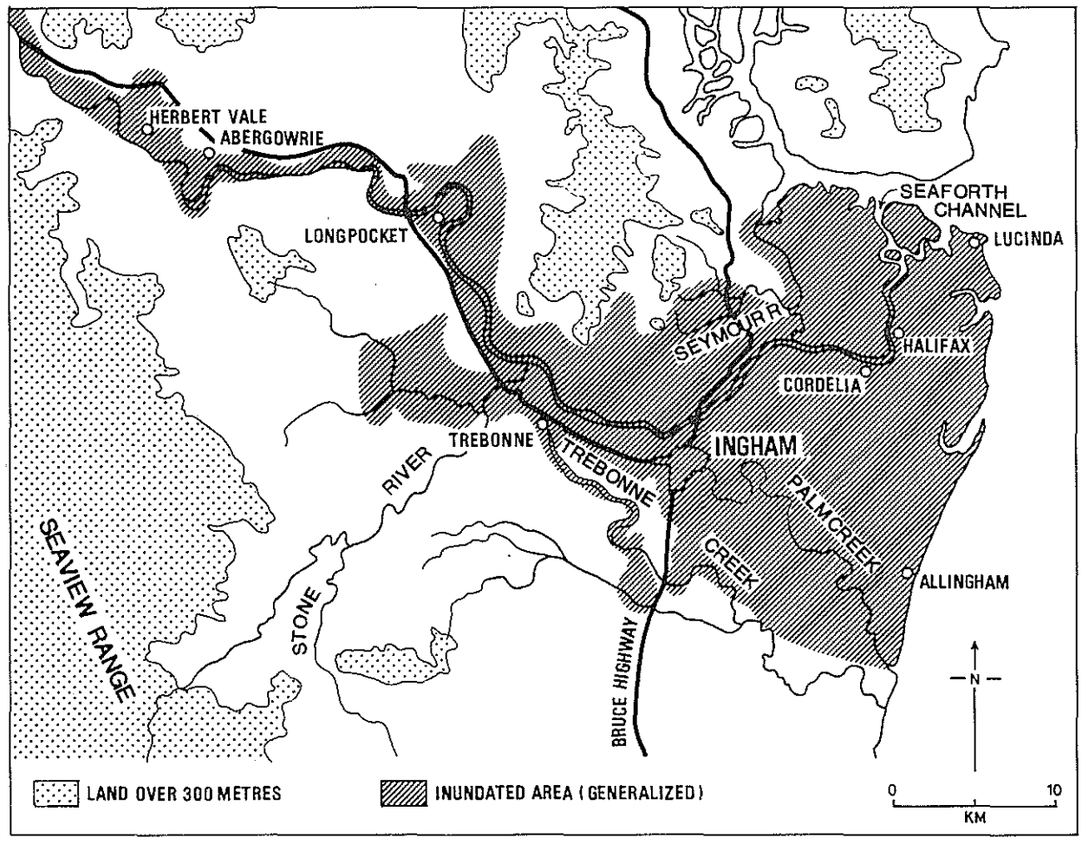

Figure 3. Herbert River delta and flood plain – flood prone area in major floods

(Sources: McIntyre Report, 1975 and Hinchinbrook Shire Council)

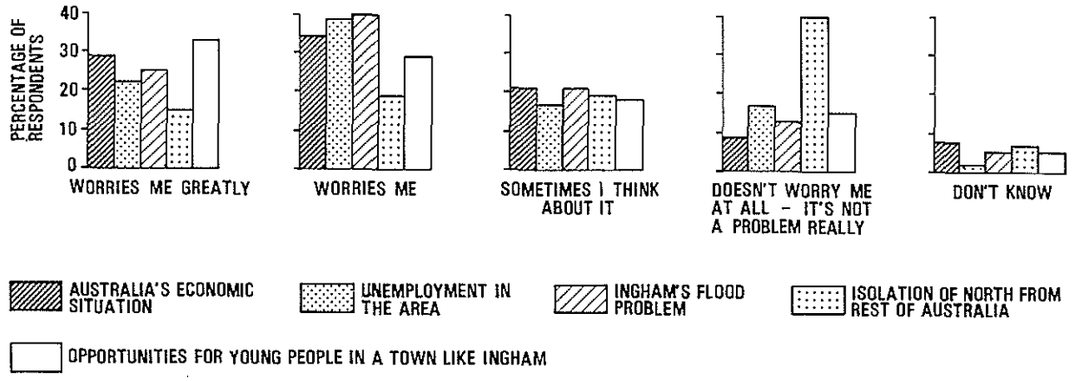

Figure 4. Respondents rating of the Flood Hazard (Q8, Appendix 1)

APPENDIX 1

JAMES COOK UNIVERSITY OF NORTH QUEENSLAND

DEPARTMENT 101

June 1977 Field Work Questionnaire

INGHAM FLOOD HAZARD STUDY

Residents please note:

1. Your name and address are **not required.**
2. Your questionnaire is **confidential** in that no results can be traced back to individual households.
3. Please tick boxes [√]

Question 1.

For how long have you personally been a resident of Ingham or district? (Not necessarily living at this address.)

- 5 yrs or less ..... [ ] A
- 6-10 years ..... [ ] B
- 11-20 years ..... [ ] C
- more than 20..... [ ] D

Question 2.

How many times have your household premises been flooded (to any depth)?

- never ..... [ ] A
- 1 or 2 times..... [ ] B
- 3 or 4 times..... [ ] C
- more than 4 times... [ ] D

Question 3.

How many times has water actually entered your house? (Include underneath areas of high set houses used for living activities.)

- never ..... [ ] A
- 1 or 2 times..... [ ] B
- 3 or 4 times..... [ ] C
- more than 4 times... [ ] D

Question 4.

How would you rate the Ingham Flood danger?

- very serious..... [ ] A
- serious..... [ ] B
- about average ..... [ ] C
- low ..... [ ] D
- very low ..... [ ] E

Question 5.

If you have never been flooded go to Question 6.

(a) Have you moved address at any time because your previous household had been flooded?

Yes..... [ ] Go to question 6.

No..... [ ]

Go to (b) ↓

(b) If 'No' did you stay for any of the following reasons?

(Please tick ( ) any relevant ones.)

- (1) Could not afford cost moving.... [ ]
- (2) Better off here than in another town... [ ]
- (3) Probably could not get work in another town.... [ ]
- (4) Family and friends here.... [ ]
- (5) Chances of another big flood coming are small... [ ]
- (6) Returns from land in good years make up for the occasional flood..... [ ]
- (7) Other ..... (please specify) [ ]

Question 6.

What do you think would be the **best** ways of doing something about the Ingham flood problem?

Question 7.

Have you done anything individually to lessen or eliminate the effects of floods on you?

Yes ☐ No ☐

If 'Yes', what?

↓

_____

_____

_____

_____

_____

_____

Question 8.

How would you rate the following problems as they might affect you?

	Worries me greatly	Worries me	Sometimes I think about it	Doesn't worry me at all – it's not a problem really	Don't Know
Australia's economic situation					
Unemployment in the area					
Ingham's flood problem					
Isolation of the north from the rest of Australia					
Opportunities for young people in a small town like Ingham					

THANK YOU FOR COMPLETING THE QUESTIONNAIRE.

EPILOGUE

EPILOGUE

My first pleasant task is to acknowledge the foregoing contributions from scholars and practitioners who have presented their experiences in researching and dealing with disasters. It is this combination of scientific knowledge and practical field wisdom which makes this volume a quite unique addition to the literature on natural disaster.

My second task is to comment on the effects this volume may have in enhancing our knowledge of natural disaster, and its implications for further research and development of strategies in community planning about natural disaster.

The two great resources of any community are concerned with the human resource and the material resource. Natural disasters devastate both. In a major cyclone or flood, there will be loss of material possessions, loss of accomodation, loss of equipment, and loss of some part of the human resource. The question that any publication such as this is really addressing is what can be done to reduce the loss of either or both resources, especially the human recourse.

Man has been living with potential and real natural hazards for a very long period of time. Early archaeological excavations revealed the remains of individuals who have been drowned, encased in lava, or in some other way rendered victims of natural disaster. Their homes, their food resources, their cultural artifacts, and their stores of accumulated knowledge have been destroyed.

Despite the prolonged period of known devastation in certain areas, individuals are prepared to locate in areas of known significant risk. On occasions it almost seems as though people do not learn from experience. Perhaps it is that the persuasion in terms of agricultural efficiency and the advantages of inhabiting alluvial deltas which are flood-prone outweigh the risks that the individuals are prepared to accept. From earlier writings, and from papers presented in this publication, it can be observed that there is a substantial reluctance by individuals and communities to be even relocated temporarily while a threatened disaster is imminent.

The psychological reality to the individual is clearly different from the physical risk that may be perceived and expressed in terms of probabilistic outcome. There are mechanisms that allow individuals in communities to deny the reality of a potential disaster: it is the study of that process which is important to those professionals and practitioners who must be involved in the emergency operations of relief to both potential and real distress and suffering.

James Cook University of North Queensland has commenced an active programme in trying to understand these processes, and trying to understand the interaction between man, the human resource, and his material resources. It is for this reason that the Centre for Disaster Studies involves physical, social and behavioural scientists who together can look at different aspects of disaster and the way they impinge on the individual and the community. The Centre aims to systematically study, evaluate, and experiment in ways that may add to our knowledge about disaster, hopefully to activate preventive processes, but progressively to reduce the potential damage they may do to our true resources.

In future years, there will be further volumes in this series which we hope will be of help to not only the communities of northern Australia, but to the world community.

Professor G.E. Kearney: BCom 1963 *(U. of Q.)*, PhD 1967 *(U. of Q.)*, Psychology. Head of Behavioural Sciences Department, James Cook University of North Queensland, 1978 - present. Lecturer/Senior Lecturer, University of Queensland, 1969-1978. OC PNG Psychology Research Unit, 1966-1969. Visiting Fellow, University of Sussex, 1975-1976. Fellow, Australian Psychological Society, British Psychological Society; Member, Australian Institute of Aboriginal Studies, Editor, *Australian Psychologist*, 1974-1978. Member of Council of the Australian Psychological Society, 1971-1978. Deputy Chairman, Psychology Registration Board of Queensland.

APPENDIX

(Letter recounting personal experiences in three cyclones – Ada, Althea and Tracy).

Darwin,
13th October, 1978.

Dear Jenny,

. . . . . *However, here goes: The Psychological Effects of a Cyclone in a Tropical Western Community.*

Cyclone Tracy was my third cyclone in Australia. I was caught in Cyclone Ada, which hit Hayman Island badly, when I was driving up to Townsville from Brisbane. I had my two boys with me who were aged fourteen and twelve at that time. We had to sleep in a school building and a village hall on different nights because the bridges were down in different places. We passed through Proserpine, which had suffered a fair amount of damage. We saw roofs off and power poles pushed over at crazy angles. To the boys and myself it was something of an adventure and the physical discomforts of hard floors and lack of washing facilities were all part of the novelty. My wife was in Brisbane having our fourth child and she was born without our knowing because communications were out. We could regard the whole thing with some detachment because we were not involved materially. It was, too, a novel experience amongst a succession of novel experiences on a long journey to a new town.

It was a different story a few years later when cyclone Althea struck at about 8.30 am on Christmas Eve in Townsville. We were now established in a house with our furniture and effects around us and so we were considerably more vulnerable. One of the things I discovered after Cyclone Tracy is that possessions really own *YOU*, you don't own them. But they are an extension of you and when they suffer, you suffer too.

Althea struck in daylight and we could watch the effect of a phenomenal wind on houses and power lines etc. I have always been interested in meteorology and I had studied the nature of tropical revolving storms in the Admiralty Manuals of Meteorology and Navigation. When the warnings of a storm came over the radio I set up a barograph and a chart of the waters off Townsville and plotted the approach of the centre until the radio went off the air. I noted wind directions and the fall of the barograph trace, which followed the classic three section decline, and was able to tell when the centre had passed. The local commerical radio station was still relaying a message from Brisbane that the storm would hit in another hour when I could tell that it had already passed.

This technical preoccupation with the instrument and the chart I think protected me from some of the consequences of helplessness that is inescapable in the midst of a storm. I moved my family from the exposed side of the house as the storm passed over and opened louvres on the lee side to relieve pressure. Knowing why you are doing something is a comforting feeling. But it was a frightening experience. We were all frightened and when it was over, and it was a comfort to know accurately when it was in fact over, we felt very relieved that we had escaped with only one hole in the roof and a damaged drain pipe. Our neighbours had not come off so lightly and I felt an urge to help them cover roofs with tarpaulins. The cyclone was accompanied by very heavy rain and high humidity. As all power was off for, I think, four or five days, and water was off, life became very uncomfortable. Then the tendency was to look more inward and people became rather weary. But throughout the experience people in the immediate neighbourhood remained unselfish and co-operative. We were more of a group and there was a certain unity to fall back on. I do not think the Cyclone in Townsville had any long-term effects on either myself or my family, except to make us very respectful of tropical storms.

Cyclone Tracey was quite different. It was a much more horrifying experience. The storm was much more savage and the devastation seemed to pass one's comprehension. I think this was the overwhelming psychological effect of the storm - an inability to grasp what had happened. This tended to produce a feeling of helplessness and apathy. This was probably more true of people living in flats. People living in their own homes tended to get going and hammer temporary roofs back on what was remaining of their houses. They did not scruple to pick up iron where they found it. This was a noticeable difference from Cyclone Althea, there tended to be the feeling of help yourself first - others come later.

I tracked the storm on my barograph (I still have the chart) and a chart of the Darwin waters. I noted that there was no change of wind direction and deduced that the centre would pass right over us. This it did and for twenty minutes there was not a breath of wind we could hear people calling out several streets away. During the first half of the storm we were on the lee side. When the centre came I decided to move my family out of the flat as we would be on the windward side for the second half. This proved a sound decision as our flat was wrecked during the second half. The storm struck at night and with no power there was utter blackness outside. The noises of collapsing houses and the crashes as windows exploded seemed amplified by the darkness. The wind drummed on the walls and roof causing the whole building to vibrate and I was very concerned that it would collapse. We were crouched in the strongest and best protected part of the flat where interior walls met in a passageway, but the trap to the roof was over our heads and this kept jumping out of its frame. There was the same feeling that I remembered from air raids in London as a boy of complete helplessness and exposure to an utterly senseless force of unbelievable power.

During the second half of the storm we were together with other people in a ground floor flat. Seven of these were young people who occupied the adjacent flat which had collapsed. I remember seeing a red Very light from a ship in distress move across the sky like a shooting star and thinking what a hopeless gesture it was. From the barograph I could estimate that the second half of the storm would last about six hours, which was the time taken for the trace to drop to its lowest point. This knowledge was again a very comforting thing to have.

When the storm was over the sun shone. There was not nearly the same amount of rain with Tracy as there had been with Althea and we were able to move about more. What I saw of the town, the port, the airport, really passes understanding. It had all happened in the invisibility of night, in such a short time, when everyone had expected Christmas, that the sudden change to disaster was unbelievable. I saw a body being taken from the water down by the harbour. In the town people were moving about concerned only with getting food, water and shelter for themselves. Perhaps it was that Darwin has always had a transient population who, like us in the Ada cyclone, were uninvolved; but there was a desperate selfishness in the air that I think has permanently changed my view of human nature. You have probably heard the stories of looters and the Greeks who were charged with stealing outboard motors. Cars were taken from car yards. I saw at the airport a fellow taking petrol from a damaged aircraft. His opinion was: 'Get out of Darwin as fast as you can. It's finished. There'll be disease and fighting over food. I'm going right now while I can'.

The cyclone had badly affected my wife. We went to Sydney and I was appointed to a school and we moved into a flat. But in a few weeks the phone rang and I was told that there were over a hundred Matric students at Darwin High and only one English teacher. I had had a very good year at Darwin High and I felt an obligation to return. I

think too, I had been unnerved by the storm and I felt I had to go back and face the place again. It was a bad mistake. We moved on to the 'Patrice' and the gloom of the town and the accommodation quickly depressed my wife to a state of near collapse that I was too involved with my own state of mind to recognise. My one preoccupation was the need to hang on, whatever the difficulties. We were battling on at School and I was determined not to be beaten when other people were even worse off than we were. At the same time I felt a certain comtempt for the ruthless way tradesmen and others were making the most of the situation. This caused a tension within myself. I felt I was doing the right thing morally, yet I could not feel any pride in what I was doing. I came to despise the place, yet I could not leave it. When the May holiday arrived my wife returned to Townsville, where my two boys were still living, and did not return.

The shock of this separation from my wife and children seemed to me at the time just one more hardship that had to be endured. I now look back on this attitude as the mistake of a disturbed mind. I now think my first loyalty should have been to my wife, but I was too confused to recognise this and my view at the time was that I was struggling with great hardships and her loyalty should have been to me. In fact I now see that she had been very sick, and needed my support.

One other effect the storm had on me is a changed attitude to property. The things I valued most, my books and records, I salvaged from the flat with the loss of about 200 books. But my car, which was a proud possession and kept in spotless order, was ruined. I still cannot bring myself to buy another car, and I am perfectly happy with a scooter. If I had my family, this would be different. For a long time after the cyclone I had no desire to own anything. I don't think I shall have the desire again to own a house. The immediate feeling, which has never quite left me, was that nothing mattered except that my family had suffered no injury. In Sydney I met one of my Matric students and he told me his mother had lost both her legs when she had been struck by flying corrugated iron. This caused me a great deal of personal distress at the time because I had known her from Parent/Teacher evenings. It became part of the obligation I created for myself to go back and stay there. I think too that as a result of the storm and the loss of my family, I lost all desire for advancement.

Even now, four years after the event, I feel there are effects that I have not been able to recognise in myself. Someone, who had also gone through it, said to me some months after that the Cyclone had been a release for many people; and what he said is true. There were personality changes, and changes of life style that were not all bad. But it will be years yet and far from here that they are all worked out.

I hope this disconnected account is of some help to you.

Yours truly,

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