New Zealand After Nuclear War

THE BACKGROUND PAPERS

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BACKGROUND PAPER 11

HUMAN RESPONSES TO DISASTER - A REVIEW

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This is one of a set of background papers prepared, in consultation with the Nuclear Impacts Study Team, from material provided by a wide range of contributors for a study of the impacts on New Zealand of a major nuclear war. Along with other sources the papers comprised the basis of the book ***New Zealand After Nuclear War****, by Wren Green, Tony Cairns and Judith Wright, published by the New Zealand Planning Council, 1987. The assumptions that the study was based on are explained in Background Paper 1, note particularly the assumption that New Zealand is not a target, and the variable assumption involving an electromagnetic pulse (EMP - for an explanation, see Background Paper 5).*

Natural and technological disasters have been with humankind throughout recorded history. Whilst the types of natural hazards have remained similar, the range of technological hazards has increased dramatically.

THE COMMUNITY AS A SOCIAL SYSTEM: PRE- AND POST-DISASTER

Communities can be viewed as problem-solving entities. During normal times, the organization of society is centred around five major functions:

- production-distribution-consumption, centring around the provision of needed goods and services which are a part of daily life;
- socialization, which represents the process of transmitting knowledge, values and norms of behaviour;
- social participation, which is performed by elements within the community that provide opportunities for social interaction;
- social control, encompassing the process whereby community members are influenced towards conformity to the norms;
- mutual support, whereby the needs arising from individual, family or other group crises are met.

The inter-relationships between these arrangements constitute the social structure of a community. During normal times, all of the major functions within a community are carried out more or less concurrently. A disaster changes all this. During the emergency period, that is the period immediately following impact (and the period immediately preceding impact if a lead time is present), a system of functional priorities tends to emerge. Many of the community's activities which serve the more traditional needs are suspended and only those aspects which have clear relevance to the immediate crisis continue to have high priority.

The establishment of a priority of functions is commensurate with the development of an "emergency social system". Such a system gives high priority to: mutual support activities, epitomised by the self-help aid and services provided in the first instance by victims themselves, and later by organizational personnel from areas away from the impact zone; and social participation, which is illustrated by an expansion of the citizenship role, an increase in informal activities, and the emergence of new groups which are principally concerned with carrying out disaster-created tasks. Social control is altered as certain components assume importance, such as crowd control, or controlling of looters (although for natural disaster at least, little evidence exists to suggest that the latter is as much a problem as social control authorities believe; the case is somewhat different in a civil disturbance or riot). At the same time, other control factors decrease, such as "nuisance" laws and traffic violations. The functions of government are also altered. Normal governmental activities are often suspended and efforts are directed toward meeting the new demands emerging from the disaster, particularly the restoration and maintenance of "essential services" and the maintenance of community order and morale. The two remaining community functions, socialization and production-distribution-consumption, are reduced in priority until later in the disaster phase continuum. Some agents of socialization, such as schools, are cancelled, while others, such as the mass media become increasingly important as agents of socialization. Similarly, the community's economic functions are disrupted, with some activities assuming greater relative significance, whilst others are suspended entirely. The production of goods and services is often suspended; the distribution of essential goods/services is channelled away from a cash-payment system to one emphasizing donation or free distribution to impact victims; and the change in patterns of consumption reflect the priorities established by the emergency social system.

There are very few communities in the world that do not face the prospect of countering the effects of a hazard at some stage of their existence. Under circumstances where the hazard continues to be a regular threat, communities can build up expertise to counter the specific threat(s), and may also develop an expectation that impacts will occur in future. When this condition prevails, and is combined with other variables (such as whether or not there is a period of forewarning or anticipated recurrence, and if the degree of damage from future impacts is expected to be considerable), a set of "standby mechanisms", or a "disaster subculture", can develop which enables community members to, more effectively cope with disasters.

Where traditional norms and expectations are not considered appropriate to the new disaster-impacted environment, or under circumstances where alternative "standby mechanisms" have not been developed, victims need to develop a common understanding of the situation before appropriate counter-measures can be adopted. Under such circumstances, human behaviour in disaster can be conceptualized as being non-traditional in response to a changing or changed environment. In an attempt to understand how individuals determine what actions are deemed appropriate in a post-disaster setting, it is important to understand how group decisions are made under conditions of uncertainty and non-familiarity. A prominent sociological perspective pertaining to this situation is the "emergent norm" approach to collective behaviour. Emergent norm theory describes how, after a crisis, people move from traditional institutionalized behaviour patterns and adopt non-traditional patterns that cope better with a changed environment. Emergent norm theory explains collective behaviour following disaster as an outcome of a spontaneous search for meaning or structure on the part of people confronted with an otherwise unstructured situation. This search for meaning is

referred to as a "milling" process. The emergent social norms that are created are an outcome of the surviving group's search for meaning.

The agreed-to definition of the situation which is developed under these circumstances may not, however, be the best possible set of normative actions for the survivors to follow. Further complications beyond those already produced by the disaster may ensue if the surviving group attempts to reconcile its post-impact predicament by basing behaviour upon common sense and/or uninformed popular assessments of the circumstances they face. The possibility exists that, when actions in unfamiliar settings are determined by "on the spot" decisions, the consequent action-set may exacerbate, not alleviate, a social crisis.

It has already been suggested that some periods of social crisis are followed by the invocation of "standby mechanisms" that avert the necessity for new norms. A "standby mechanism" is a normative set of roles, statuses, prescriptions and proscriptions which has been developed so as to enable an individual to cope with a changed or changing environment. In theory, when effective standby plans are available, people do not need to undertake the more time-consuming and ambiguous process of "milling" in order to establish an appropriate behaviour-set for responding quickly to an unfamiliar environment. People will, in theory at least, comply with a pre-established set of behavioural guidelines so long as they believe that a crisis exists and that the alternative norms will promote successful coping.

AN OVERVIEW OF COMMUNITY RESPONSE TO DISASTER

Many organizational, community and even governmental counter-disaster strategies have not kept abreast of disaster researchers' findings. Furthermore, popular images, rather than empirically validated research about disaster behaviour, have important policy implications, since common sense frequently tends to be the major basis for critical decisions on the part of organizational and political officials involved with disaster operations.

Response at the individual and group level

Policies, plans and programmes concerning disasters have been developed in the past, based upon assumptions about human behaviour in disasters. The majority of these assumptions are centred on the theme of personal chaos, the assumed "weakness" of the impact victim, and the fragility of typical social organization in coping with social crisis. Field research within the last two decades has shown that, contrary to popular images and understanding, the majority of people exposed to extreme events are resistant; they exhibit initiative and employ critical judgements, even though they may only turn to the familiar. There is no real necessity for strong leadership and centralized control, or for the imposition of an authoritarian structure in the immediate post-impact period; neither is the assumed immobilization of local emergency organizations through role conflict much in evidence. Disaster-impacted people respond with a remarkable degree of self-control, and they make remarkable adaptations which reduce further injury and increase the probability of survival. They do not exhibit anti-social behaviour, nor are they passively dependent on outsiders. Pandemonium and social chaos, panic flight, hysteria, frenzied crowd behaviour and other irrational actions are not present in either the quantity or quality assumed by community officials and/or planners with either limited or no disaster experience.

Reactions to disasters do vary, however. Past research and field studies have indicated that reactions are contingent upon the stage of the hazard, the personality of the victim as well as the victim's age, sex, location, education and experience, and the choices available to the victim. Choice depends on a complicated set of variables, including an understanding of the nature of the disaster, perceived knowledge of alternative actions, experience, resources, and confidence. Nonetheless, people remain discriminating, making critical judgements based on their view of the situation. Activities during the emergency period of disaster are structured around a hierarchy of informal groups and leadership. The primary focus is upon family, then small groups such as neighbours and co-workers. When seeking help after a disaster, the order of priorities is usually from the informal to the formal. Membership groups, for instance churches and clubs, are used only after help has been sought from family, neighbours or close friends. Government agencies are looked to only after other sources have been exhausted.

Nevertheless, disasters cannot make everyday social pathologies disappear. If a group in the pre-impact period contains a significant percentage of disoriented individuals, or is permeated by a high degree of anti-social behaviour, or is beset by bitter divisions and conflicts, the same characteristics will exist during post-impact phases. Past behaviour is still the best predictor of future behaviour.

Sociologists, psychologists and psychiatrists have long debated the mental health effects of disasters. This controversy seems to have developed in the absence of any formal theory. One position, developed primarily by psychiatrists, argues that catastrophic life events produce adverse psychological reactions which are present both immediately post-impact and in the long term, possibly persisting for several years or perhaps for the rest of the victim's life. This view implies that disaster is a direct and unconditional cause of mental illness. The contrary position, argues that while short-term psychological reactions frequently occur, typically in the first few weeks post-impact, longer-run reactions are infrequent and probably result from a variety of factors, of which disaster impact is only one. The debate about mental health consequences remains hopelessly confused because proponents on each side draw on different conceptions of impacts (that is, mental health vs problems of living), different methods of measuring them, and often different types of events.

Response at the organizational level

Inherent within the new arrangement of societal priorities following disaster is the re-alignment of organizations, both those which are charged with disaster-ameliorative tasks as well as those which have no apparent or obvious role in counter-disaster activities.

A natural disaster, by definition, causes a temporary unravelling of the social fabric which encapsulates the processes, structures and interactions of societal routines. Organized activity is not exempt from the consequences of disaster-induced societal disruption. Disruption to organized behaviour should be expected in a disaster yet it is often overlooked when assessing the long-term consequences. Disasters are often regarded only as a problem for the individual or the small group. The consequences of a disaster on organizations are also often overlooked by officials within them. Internal decision-making and communication hierarchies, as well as inter-organizational relations, for example, are subject to change.

Disaster management can be viewed from a number of conceptual positions. One approach is to focus on the specific tasks organizations perform in the community over time. In this approach, the importance of organizations which become involved during disasters can be clearly illustrated. Two distinct sets of organisations can be described. One category, the Disaster-Relevant Organizations (DRO), is applied to a set of task-specific organizations whose legislated and, in most instances, legitimated activities require that they be the vanguard of organized response. The publicly-acknowledged tasks of these organizations are concerned directly with avoiding any further disruption to the status quo, and of saving and preserving life and/or property. This set of task-specific organizations includes the Police, the Fire Service, medical services, and, in the New Zealand setting, the Ministry of Civil Defence. DROs represent a community's frontline organized response force. They also reflect the priority society places on the saving of life and property. However, these organizational types are not capable of restoring the disrupted social system. Another set of organizations is responsible for this.

The term Emergency-Related Organizations (ERO) is applied to those organizations whose primary contribution is to maintain, service, and if needs be, restore the physical appurtenances within society, and to provide general welfare and relief facilities during periods of social crisis. EROs comprise organizations such as city or county council public works departments, electricity and gas utilities, main roads departments, and insurance companies. They also consist of social security and welfare departments, health departments, and voluntary organizations such as the Red Cross, and the Salvation Army.

Another approach to the conceptualization of organizational disaster behaviour is to look at organizations in relation to (i) the nature of the tasks which are undertaken, and (ii) the post-impact structure of the organizations. In every disaster a number of different types of organizations carry out tasks which ameliorate impact. These tasks may be old, everyday "regular" tasks; or they may be new, or unusual "non-regular" ones for the particular organization. In similar manner, organizations can be distinguished on the basis of whether their pre-impact structure is maintained or a new post-impact structure emerges. From these two variables four types of organized behaviour can be developed:

Type I: "established organization" - regular tasks and old structure;

Type II: "expanding organization" - regular tasks and new structure;

Type III: "extending organization" - non-regular tasks and old structure; and

Type IV: "emergent organization" - non-regular tasks and new structure (Dynes, 1970).

A Type I organization, for instance the Police and Fire Services, becomes involved very quickly following impact (sometimes before impact if there is prior warning). Their pre-existing structure enables them to mobilize quickly. A Type II organization, the Civil Defence for example, is a result of prior community planning. The organization exists "on paper" and the core of it exists prior to impact. Mobilization is slowed because it has to bring in voluntary personnel to increase a small number of permanent officers. Type III organizations are probably the most numerous organizational group. The usual task of the organization is disrupted, and hence it becomes diverted to essential disaster activities. A

construction company, utilizing its workforce and machinery for search and rescue operations would be a Type III organization. A Type IV organization develops after the disaster and is brought about by the inadequacy of Type I and Type II organizations to satisfactorily fill all the requirements and gaps that have been created by the disaster. Type IV emergent groups tend to take on new tasks that have not been incorporated into the overall counter-disaster strategies adopted by the established or expanding organizations.

Response at the government level

Most administrative structures for disaster planning and management are fragmented. There are advantages as well as disadvantages in the fragmentation of disaster counter-measures.

Local governments are established by Acts of Parliament. It is at the local community level that counter-disaster activities have to be implemented, because it is at this level that the social and physical impact of most disaster agents is experienced, even though in some cases the effect of impact is more widespread. It is well-recognized that "grass roots" local government planning for disaster preparedness is an appropriate means of combating threat. The type of activities that any community will initiate in response to disaster will be dependent on the available resource-base, and the willingness of agencies to apportion resources.

Some recent United States research, however, suggests that local governments may not be capable of fulfilling necessary disaster planning and management functions. These studies have indicated that few officials have thought about or planned for local government disaster action beyond a level of general, non-specific preparedness. Furthermore, these studies suggest that citizens' definition of local officials' everyday roles differed markedly from their definitions of the roles officials should play in disasters. However, officials maintained the same definitions for both environments. Citizens expected public officials to play a much more active role, while officials themselves favoured a reactive, custodial orientation. In a post-impact environment, the perceptions officials had of their role would be incongruous with the needs and demands created by the disaster.

Explanations for the weak local government response to disaster have tended to focus on ineffective municipal officers; lack of community preparedness; inadequate understanding and/or awareness of potential local hazardous threats; lack of adequate skilled human planning and/or material resources; central (or state, if this exists) government interference; and/or excessive demands created by the disaster. Whatever the cause, local elected officials do not usually play a leading role despite their formal, legal authority (in New Zealand refer 1983 Civil Defence Act, the Town and Country Planning Act 1977, the Municipal Corporations Act 1954, and the Counties Act 1956), and despite their being viewed as the level most responsible for the development and implementation of local hazard policy.

Central government has a primary responsibility to protect citizens against the threat of disaster. It has considerable indirect influence on disaster management. For instance, armed forces to deter or resist external aggression can be, and usually are, used to aid in the mitigation of disasters. The armed forces serve as a vehicle through which resources additional to those available at the local government level can be obtained. Another central government instrumentality, the Ministry of Civil Defence, is charged with coordinating and directing national government resources for the establishment and maintenance of local self-help

units. Civil Defence also undertakes training schools for skills development and mental preparedness for disaster amongst its students. In addition, central government has the power to direct police resources to assist pre- and post-impact actions and it has the legal capacity to draft additional support ("civil defence police" - refer Civil Defence Act 1983 S17) if the situation necessitates. The central government also has considerable technological resources available, such as the Ministry of Works and Development, New Zealand Meteorological Service and the Department of Scientific and Industrial Research, all of which have specialist personnel and equipment for mitigating disasters.

In New Zealand central government has responsibility for counter-disaster legislation. This includes legislation for the existence of compensation for earthquake and other natural as well as man-made hazards (the Earthquake and War Damage Act, 1944), and for legislation covering the statutory structures, powers and responsibilities during and immediately following a civil defence emergency (the Civil Defence Act, 1983). It is also central government's responsibility to decide what requirements are necessary for counter-disaster actions, what organizations will be responsible for aspects of disaster management operations, and what authority each organization will have to carry out those functions.

Regardless of these charges and responsibilities however, central and local public administrations have generally neglected to consider emergency or disaster management within the mainstream of their activities. Historically, disaster management was considered only a function of law enforcement and fire departments, with support in the event of a major catastrophe from defence, public health, and civil defence organizations. There has been a consistent institutional and political lag in identifying and mitigating increasingly hazardous situations. Public administration in the disaster arena has generally been limited to a crisis-reactive management approach, whereas the seriousness of the situation demands a much more proactive stance. Furthermore, as the problems are getting more complex, the public solution mechanisms are not developing at a rate sufficient to manage the problems. As time goes on public response seems to be less capable of meeting the demands of disasters.

SOME NOTES CONCERNING NEW ZEALAND SOCIETY

When natural disasters have occured in New Zealand, the number of deaths and injuries, and the amount of property destroyed and/or damaged has been relatively limited when compared to more capital-intensive and densely populated nations. In addition, natural disasters have tended to occur in relatively unpopulated and/or undeveloped regions of the country (for instance the 1968 Inangahua earthquake, the 1978, 1980, 1984 and 1987 Southland floods, and the March 1987 earthquake in the Bay of Plenty); or alternatively, for contemporary New Zealanders, they happened a long time ago (for instance, the 1929 Murchison earthquake). As a result, while a sizeable number of New Zealanders may know something of events like these, very few have directly experienced their effects.

Every now and then, however, a natural disaster has occurred in a densely settled area (for example, the 1931 Napier earthquake or the 1942 Wellington earthquake), or is of recent origin (for example, the 1979 Abbotsford landslip in Dunedin). Probably the most socially devastating natural phenomenon in New Zealand's history was the effect of the influenza epidemic which, in a space of three months during 1918, killed about 6,600 in a population of a little over one million. It is also fortunate that New Zealand has not had any significant human-made or technological

disasters, although it has been subjected to a number of industrial/commercial emergencies (for instance, the 1973 chemical spillage at Parnell). It has also had transportation emergencies (the 1968 capsize of the "Wahine" ferry, the 1979 Air New Zealand DC10-30 crash on Mt Erebus, Antarctica, and the 1953 destruction of a railroad bridge at Tangiwai with the subsequent death of 151 train passengers).

Because of the serious nature of the earthquake threat in particular, the New Zealand government has taken some interest in earthquake mitigation. This governmental interest has also been associated with other types of disaster agents (parts of the country are at significant risk from volcanic activity and also there are significant weather-related problems like storms, floods and landslides). The 1931 Napier earthquake was probably the starting point for government to realize the importance of its involvement. This condition was created as much by the extent of death and destruction following the earthquake, as it was influenced by the attitude of New Zealanders in general who realized they would not be able to bear losses themselves.

Notwithstanding the multitude of local government units which characterize New Zealand society, the New Zealand government is a strongly centralized one. There is clearly a widespread public perception that government will be expected to remedy social problems. This perception is a product of years of government intervention and the resultant vested interests in that intervention. In addition, public expectations of New Zealand government are influenced by a longstanding popular concern for human equality. This commitment for equality (the reverse of which is usually synonymous with being "undemocratic") has a continuing influence on government policy, and serves to justify much government intervention in the continuing redistribution of society's wealth and opportunities. This expectation of government action has important implications for disaster mitigation policy.

In its overall approach to disaster mitigation, the government's programme is heavily compensatory, being primarily remedial rather than preventive. The emphasis on compensation stems from a crisis-response mentality which tends to downplay the prospects for future disasters. Thus, the public administration orientation is a reactive and not a proactive one. This position harmonizes with the general public's attitude towards disaster threat, and offers a partial explanation for the widespread assumption that social crisis periods will be handled by public authorities.

A third factor worth mentioning is that recent experiences of most people to threat, especially to the earthquake hazard, is not sufficient to overly concern them or to convince them of the need to develop contingency plans independent from those they believe the government has instituted. The earthquake hazard is widespread throughout New Zealand. No part of the country can be considered immune from earthquakes although some regions are subjected to more frequent shaking than others. Thus most, if not all, inhabitants have experienced an earthquake at some time or other. However, the experience most people have is of a low magnitude episode which seldom results in physical damage or emotional distress. Christchurch's recent jolt from a moderate earthquake (125.25) on 9 March 1987, is a case in point. For most New Zealanders, therefore, an earthquake is an occasional hazard which can be easily ignored. This complacency towards earthquakes is transferred to other potential hazards. Incidentally, it would be difficult under circumstances such as these for appropriate "standby mechanisms" (a disaster subculture) to develop, despite several of the preconditions for the development of a subculture being present.

Social science disaster research in New Zealand indicates a lack of understanding of and indifference to natural hazard threat; apathy about the necessity to prepare contingencies; a refusal to become aware of the inherent danger; and a strong faith in public authorities doing something should it need to be done (see, for instance, Britton, 1981, 1984a).

A similar attitude is evident within the organizational sector of New Zealand society. Twenty-three organizations in the Christchurch region were surveyed in the late 1970s to determine the social implications of earthquake prediction. Only three had specific plans for the mitigation of earthquakes, partly because many of the respondents believed that Christchurch was not earthquake-prone. When organizational representatives were asked whether or not their organization would act on advice to evacuate or suspend operations on the basis of an earthquake prediction, over half stated their organization would do so, if the prediction and request came from "a reliable source". Furthermore, the majority of representatives believe that legislation should be promulgated to ensure at least a minimum set of actions is pursued by the organizational sector. Any laws that were enacted, however, should not be overly restrictive.

It could be that poor performance in disaster mitigation by public authorities would erode the faith that business people and other citizens currently hold. The general public's attitude about the capability of public authorities to counter emergencies and disasters is at variance with attitudes held by many public administrators and "front-line" disaster organizational personnel. The existence of legislation such as the 1944 Earthquake and War Damage Act and the 1972 Accident Compensation Act, a no-fault accident compensation scheme, is largely due to the tendency of New Zealanders to expect such support. It might be unwise to rely on these programmes as firm evidence of the government's continuing commitment to social welfare. There is some evidence that government is hesitant to engage in further preventive mitigation, partly because of a concern about the prospective liabilities of the government and its officials (see Huffman 1985). Another related difficulty concerns the fund established by the Earthquake and War Damage Commission. It is quite evident that the fund could not cope with an event comparable to the 1931 Napier earthquake (see Britton, 1982 - pp 4-5). Also, a 1983 government-sponsored review of planning and building controls concluded that local authority officers all feel inhibited in providing a community service because they could be held responsible for their actions during an emergency.

The view that public authorities are able to cope with the effects of disaster in the manner that the general public expect is not fully shared by the personnel involved. The following extract, taken from a paper delivered by a Ministry of Civil Defence official that refers to the flooding in Southland in 1984, presents a view very different from the public's undiminished faith in the disaster network's assumed current capabilities: "The recovery programme instigated after the Southland flood may appear to have run smoothly, but in fact it did not. Personalities within organisations clashed, organisations were unsure of their responsibilities and the flow of information to organisations and the public was sometimes irregular, incomplete and wrong" (Berry, 1984).

The above extract highlights other problems confronting the overall effectiveness of governmental response. There are problems relating to inter-organizational coordination, with boundary disputes regularly occurring; disaster-relevant tasks are often not undertaken, or are duplicated by other organizations; ambiguity exists over legitimate authority, caused by a lack of role clarification; there are problems relating to the adoption of an inappropriate practice ideology within

the disaster-relevant organizational network, which does not provide a realistic framework for disaster management; there is insufficient initial information about the disaster event for authorities to act, and what information is available is often not shared; intra- and inter-organizational communications facilities are often inadequate; information between disaster services and the concerned/affected public is generally nonexistent. Many of these conditions are addressed in the report of the Commission of Inquiry into the Abbotsford landslip, one of New Zealand's most recent significant natural hazard events. They are similar to comments made by Berry following the 1984 Southland floods. All point to inadequate disaster planning.

This section has indicated a lack of commitment by organizational decision-makers and by public policy-makers. It has also strongly suggested there is a lack of understanding of, and indifference to, the natural hazard threat by the general public. This is not, however, unique to New Zealand. Natural hazards and their concomitants - natural disasters - are seen as low-salience issues in many sociocultural settings. For most local communities throughout the world, as well as for state and/or national governments, natural disasters are toward the bottom of the list of problems they are facing. Other problems faced by communities are simply regarded as being more urgent, and more predictably so, than the possible consequences of low-probability disasters. Because disaster impact has low salience, disaster preparation and planning also appears to have low priority. This can be a serious miscalculation and the impact of this logic can be devastating.

SOME FACTORS RELATING TO DISASTER PREPARATION AND PLANNING

Levels of community preparedness include planning for the management of disaster impact, as well as plans for post-impact reconstruction. The level of community preparedness affects, directly or indirectly, all of the factors discussed so far. It may be thought of as the "stockpile" of pre-existing resources to deliver emergency services of all types to a given community.

Many officials who direct disaster-relevant organizations assume that expansion of the routine will meet the needs generated by disaster. This is not the case. Disasters differ from more routine emergencies because of at least six qualities: (1) uncertainty; (2) urgency; (3) the development of an emergency consensus; (4) expansion of the citizenship role; (5) convergence; and (6) de-emphasis on contractual and impersonal relationships. Disasters generate a complex response which involves not only task-oriented behaviour, such as the care of the injured and restoration of essential community services, but also maintenance functions, such as assessment, coordination, control and authority.

There are universalistic demands that will be found in all disaster settings, although their particular content will vary from one setting to another. These universal demands are of two types: disaster-agent generated demands, and disaster response-generated demands. There are at least eight agent-generated demands: (1) warning; (2) pre-impact preparations; (3) search and rescue; (4) care of the injured and dead; (5) welfare needs; (6) restoration of essential community services; (7) protection against continuing threats; and (8) community order.

There are at least five response-generated demands: (1) continuing assessment of the emergency; (2) communications, intra- and inter-organizational as well as communications between the impact zone and external regions; (3) mobilization and utilization of resources; (4) coordination; and (5) control and authority. Referring to pre-impact planning, there are an additional eight antecedent demands that should be developed if the standardization of organizational behavioural patterns and behavioural expectations within a community is to be realistic. These are: (1) identifying the characteristics of all potential disaster agents and their probable effects (primary and secondary); (2) development of hazard maps indicating the location and extent of likely impacts, the expected periodicity, and the amount of damage/disruption expected under various conditions; (3) development of further education programmes concerning hazard awareness and hazard reduction; (4) the accumulation of information about available community resources which may be required following impact, together with the location, amount and availability of those resources as well as any prerequisites essential for their utilization; (5) production and development of plans to integrate and coordinate human and material resources, including private, voluntary and statutory sources; (6) the maintenance and revisions of plans; (7) production and continuing development of training programmes; and (8) the institution of an evaluative component to promote effectiveness.

The public are often not involved in disaster-response planning and, as a consequence, the plans do not reflect the collective perception and concerns of citizens. Research has shown that knowledge of what to do, citizens' judgements, confidence in authorities, and prior decisions all affect the success of disaster response. Four variables are critical for an individual to decide to undertake some disaster-protective measures: (1) the development of a warning belief (there must be a perception that the threat is real); (2) the individual's perception of the level of personal risk (personal risk must be perceived as high); (3) whether the individual has an adaptive plan (the person must have some idea of how to protect him or herself); and (4) the family context (the individual must be able to account for the whereabouts and safety of other family members). These behavioural components are often inadequately addressed or reflected in community plans. Consequently, even if a community disaster plan is ready, the citizens often are not.

The process of planning should focus on instilling knowledge and reducing the unknown, and should incorporate a behavioural profile of the community that includes the attitudes, awareness, preferences and resources of the citizens. The objectives and strategies of a disaster plan should combine technology and a well-structured administrative system on the one hand, with judgement and community priorities on the other. A planning process should therefore be sought that includes public participation and establishes mechanisms for the successful education of the public.

Effective disaster planning requires that plans be adjusted to people and not that people be forced to adjust to plans. The implications of this theme are pronounced, yet too often are not well understood.

A COMPARISON OF NATURAL AND TECHNOLOGICAL DISASTERS

In recent years policy-makers have turned to disaster researchers requesting information on how much of our knowledge of citizen response to natural disaster can be used to design and implement plans to cope with nuclear disasters.

The matter of comparing natural with human-made threats did not begin to appear in the professional literature at all until the late 1970s. In part, this reflects the fact that historically a large component of disaster studies has been journalistic and descriptive in nature. Hence, attention has often been focussed upon the disaster event itself - the flood or earthquake - and descriptions of specific consequences of the disaster for victims. Within this context, many disaster researchers have argued that different disaster agents have different characteristics and impose different demands upon a community; and thus human reaction to different disasters is likely to be different. Such reasoning specifically focusses on the uniqueness of the different events. However, this approach involves essentially a classification system for disasters which focusses only upon the surface or visible properties of each event.

In the past decade, however, there has been a transition in disaster studies toward an increased concern with the development of conceptual schemes for understanding and explaining human response to disaster. In doing so, attention has turned from describing disasters to understanding the demands and stresses resulting from their impacts and to cataloging various strategies for coping with such demands and stresses. Within this perspective, there are no obvious significant conceptual or theoretical reasons for treating natural and human-made disasters, such as Three Mile Island or Chernobyl, as fundamentally different, in that they must be separated and studied using different frameworks.

Based on this premise, it has been argued that a nuclear power disaster would not create essentially different problems for community response. However, the way people perceive such a nuclear disaster is different from the more "conventional" natural or technological disaster. The idea that people have a different attitude to nuclear disasters requires that this "emotional" dimension be taken into account and that the necessary qualifications be made when such perceptual differences may have a bearing upon human performance.

Two aspects of this emotional perception require mention: risk perception and experience. The primary perceived agent of threat to the human population in a nuclear power disaster is widespread ionizing radiation. While radioactivity is known to be potentially lethal, carcinogenic and mutagenic, it is not visible or otherwise sensible. When an "invisible" threat hangs in the air or is lodged in the tissues of the body for an indeterminant amount of time, survivors have no sure way of knowing how much damage has been done or is yet to be done. The event, so the argument goes, is never quite over, and the cause for alarm never quite disappears.

The second aspect of the emotional response to nuclear disaster is that citizens lack a reference point in their experience of such events. With the exception of the survivors of the atomic bomb drops in Hiroshima and Nagasaki in 1945, and citizens near the few nuclear power plant accidents, very few people have any direct experience of the effects of radioactive fallout.

It would be helpful for planners in New Zealand (which, it is assumed, will not be a direct nuclear warfare target but might incur secondary hazards such as essential services, electrical and communications disruption caused by EMP) to look at the social and behavioural consequences of Chernobyl, Bhopal, Three Mile Island, Love Canal, and Seveso, and draw parallels between these events and New Zealand's potential predicament.

In terms of human experience, probably the closest parallel humankind has to the

widespread, almost universal, social disruption envisaged in a post-nuclear war society, especially in combatant countries, is the "Black Death", which occurred in the fourteenth century. The "Black Death" descended on a people who were conditioned by their theological and scientific training into a reaction of apathy and fatalistic resignation. Nothing could have provided more promising material on which a plague might feed. The concept of a "corrupted" atmosphere drifting across the world and overwhelming all, often in a remarkably short space of time, produced behavioural patterns in some that broke down further the social routines and normative structures of Medieval society. The plague created both recluses and hedonists, religious zealots and scape-goats. Others continued to behave in an ordinary way, trying to conduct their lives within a "business-as-usual" framework, the social standards of which had been relaxed or completely suspended by others.

Similarities between the behavioural responses of a Medieval population and a post-nuclear war society are likely to be tenuous however. Medieval people were equipped with no form of defence - social, medical, or psychological - against a violent epidemic which killed millions. Contemporary society has a far greater knowledge of likely possible effects, and is better able to prepare in advance for many catastrophic events. Given this, the overall behavioural expectations should be different from those which prevailed in the fourteenth century, and it is certain that responses to future similar predicaments will be more adaptive.

The scientific analysis of the social implications of earthquake prediction has certain parallels to current studies relating to the social and behavioural impact of nuclear warfare. At this stage, however, it is difficult to know for certain whether there could be any useful transfer of knowledge from one to the other. Nevertheless, it may be useful to at least highlight some aspects of the current thinking in earthquake prediction analysis.

In the first instance, social scientific studies in both the earthquake prediction and the nuclear warfare areas have significant "grey areas". The most obvious parallel is that it is impossible to predict human response to an event which has not yet occurred. Both earthquake prediction and nuclear warfare implication studies operate with a future which is unknown. In addition, variables important to behavioural responses are similar for both conditions. For instance, both have lead-times that are likely to provide immediate advance warnings of impact - between prediction and anticipated earthquake, on the one hand, and increasing hostilities and actual nuclear war on the other. Potential problem areas, such as how certain the predictor is about whether the earthquake will occur, the credibility of the predicting agency, where the earthquake will occur, and how big the event will be, parallel the difficulties facing the certainty of nuclear war, the credibility of a government when announcing the imminence of hostilities, and the areas assumed to be targeted. If any of these change, behavioural response will also change.

Despite the obvious difficulties inherent in current earthquake prediction studies, some very useful scenario developments have been produced, and from these some useful theoretical insights have been acquired relating to community response to future harmful events. For instance, an important concept in explaining human response to hazard predictions and warnings is *warning credibility*. Three important elements influence public perception of earthquake prediction credibility: (1) the reputation of the person or organization making the prediction; (2) confirmation of the information given in the prediction from other sources; and (3) certainty of the threat, or how sure the predictor is that the

earthquake will occur. The public gives more credibility, and has a greater propensity to respond, to predictions based on scientific evidence. Furthermore, the greater the scientific reputation of the person(s) issuing and validating the prediction, the more credibility will be granted the prediction by the public. The more complete the information is about the anticipated event (information is not withheld from the public), the greater is the likelihood that the public will accept the information as being correct and will act on it.

As a general rule of thumb, there is human tendency in the face of adversity to seek evidence in support of maintaining the status quo. Some people try hard not to believe information that a disaster is on its way. People will not want to decide to make changes in their lives in response to an earthquake prediction, so they will use all available information to find reasons not to take actions. Vague or conflicting information in the news media about the prediction or about appropriate actions will increase doubt about the validity of the warnings.

Level of uncertainty is another concept useful for explaining response to future events. It is likely, because of the nature of prediction technology, that the first few predictions will have some uncertainties. In addition, even if the parameters are stated with clarity, lack of prediction experience may generate suspicion and bewilderment. The lead time of a prediction may range from a day to perhaps a decade. As the lead time increases, the level of uncertainty rises but, paradoxically, as lead time increases, the ability to take a broader range of adaptive responses may also rise. Shorter lead times may, however, increase the tendency to take action.

Image of damage. People's perceptions of damage or losses from the predicted earthquake will also influence response. Objectively, expected loss can be measured by exposure to risk, but the image of damage will also be influenced by maps of projected damage, vulnerability assessments, past experiences, and other related knowledge and information. Following a prediction, maps of potential damage will be published. These maps could vary in complexity from a simple map depicting areas which are forecast to experience heavy damage, to computer-generated maps showing isoseismic intensity patterns. Maps could also vary on the basis of different underlying assumptions and definitions. The publication of different maps would create confusion and uncertainty amongst the public. Research indicates that people who believe that they will experience heavy damage also have a greater belief that a predicted earthquake will occur. In addition, images of higher damage produced by a map can stimulate a search for more information on vulnerability. Therefore, it is vital that maps contain the most accurate available information. Faulty maps could stimulate too much or too little adaptive behaviour.

Inaccurate images of damage will result from several causes, but among the most prominent in the literature on natural hazards is that people deny or diminish the threat of hazards to themselves and their possessions - "floods can't happen here", or "lightning doesn't strike twice". There is no basis on which to conclude that this will not be the case with a predicted earthquake. Denial of personal threat will cause some people to underestimate damages. People also tend to assume that their last hazard experience will be similar to subsequent ones. This will cause some to overestimate damage and others to underestimate it.

Information utilization. Everyone will not have equal amounts of information, nor does everyone have the same capacities for understanding risk information. Some general conclusions from studies conducted on how people perceive, interpret

and utilize probabilistic information in decision-making are: (1) people will have difficulty understanding the meaning of probability or confidence levels attached to a prediction; (2) people will have difficulty estimating the consequences of the predicted event; (3) people will not be aware of all the actions they could employ to mitigate the possible consequences; (4) people will have difficulties in deciding on the proper behaviour to adopt; and (5) because people have different goals, their behaviour may differ from what the experts perceive as being advantageous or optimal.

Those who have access to good information are more likely to reduce earthquake vulnerability and increase their preparedness for emergencies. Equity in access to information will be a troublesome concern. Information must be (1) written or prepared in different ways so that different kinds of people and groups will perceive the problem accurately; (2) presented or delivered in different ways so that different people who have different levels of access to information have a relatively good chance of receiving the information.

The act of *relocating* work, activities, people and/or resources out of the area at risk, or from the focal point to the periphery of the area at risk can serve to reduce vulnerability and/or increase emergency preparedness. However, *commitment to target areas* is a factor that might create initial difficulties for the implementation of this strategy. A family, corporation, or local business can be tied to a specific location for a variety of reasons which makes moving difficult.

Although the parallels between earthquake prediction and assessments of nuclear war impacts may only be tenuous, there could be common characteristics in the likely social responses that are worth more vigorous study. This may be especially so for New Zealand in the immediate aftermath of a northern hemisphere nuclear war, where there could be few, if any, visible cues to indicate to the population that things have changed, or are about to change, rapidly for the worse.

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