Approaches to community safety: risk perception and social meaning

by Dr Paul Barnes, Manager (Corporate Risk), Corporate Performance Division Department of Primary Industries (QLD)

Introduction

In representative democracies it is a reality that many decisions with potential to affect our lives are almost invariably made by others. People can evacuate their homes as a cyclone approaches or choose to take part in certain hazardous activities, but they cannot avoid the results of another person's decisions. Such power differentials often result in long-term concerns among members of the public who find themselves distant from the decision-making processes.

A number of additional factors are important for any examination of these concerns. They may be related to a lack of public trust and confidence in the institutions involved in the control of hazards and regulation of risk (Wynne 1987, p. 10; Slovic 1993), a reputation of institutions for not disclosing key pieces of information, or inefficiencies in the process of communicating with the public (Wynne 1989b).

A common problem in situations of conflict over known or suspected links between industrial hazards and suspected health impacts, for example, has been a generic public disbelief about reassurances by regulatory experts of minimal risk to health, and in some cases life, posed by inadvertent or inescapable exposure to hazardous material. Public fear of large scale industrial disasters or concern about harm from less visible slow-burn toxic exposures are often seen as misplaced by authorities who point to more obvious threats to health and well-being existing in everyday life (Otway & Simms 1987, p. 131). Other factors such as inequity in exposure to harm, or fear of the catastrophic potential of some hazard or the safety and acceptability of a range of modern technologies, are also important (Kasperson 1987, p. 44; Otway & von Winterfeldt 1982, p. 254).

Recognition of this phenomenon is not new. It was once thought that the public were exhibiting irrational behaviour or had a deficient understanding of science, especially the science of risk assessment (Dunwoody & Neuwirth 1991, p. 12). While this explanation is initially inviting, it is by itself, too simplistic.

Members of the public are concerned about the *safety* of the wider environment and their surroundings. At the same time, regulators may be seen to be concerned about helping to provide safe environments. An impasse arises in this mutuality when regulatory expertise loses credibility in the eyes of the public it is meant to protect. Reduced public trust in and disbelief of authority can be a result.

In addition to political and bureaucratic factors, this gap of trust and credibility is characterised by significant social and cultural differences between regulatory expertise on the one hand and the public on the other. These factors can be deconstructed further to consider contrasting approaches to the concept of *risk* and semantic variation in the use of terminology by institutions and members of the public.

This paper examines aspects of this phenomenon of trust and credibility as a core issue impacting on the capacity of government to enhance health and safety at the community level. It argues that greater understanding of community viewpoints can be gained from a detailed consideration of the conceptual underpinnings of risk and an appreciation of human responses to real emergency situations and the uncertainty and dislocation that often accompany them.

The professionalisation of risk

In traditional societies explanation of the meaning and purpose of disasters and other catastrophic events disruptive to the social fabric are known to have relied heavily on the use of myth and metaphor (Covello & Mumpower 1985, p. 103). In such situations, consideration about the nature of danger, anticipation of calamity and knowledge about the avoidance of hazardous situations manifested at a community level. This in fact might be expected as it has been noted that in situations where doubt, uncertainty and risk are present, shared ritualistic practices are often evident (Poggie Jr. 1980, p. 123)[1].

In post-traditional times however, response to danger and situations of harm have been transformed from the level of *folk* discourse to that of an *expert* centred concept (Plough & Krimsky 1987, p. 5). The translation of responsibility from community to expert occurred alongside the increase in both the scale and amount of industrialisation and technological development worldwide and the rise of the 'modern state' as a dominant political institution (Plough & Krimsky 1987, p. 5). The process of vesting accountability for community safety with a professionalised bureaucracy was part of this broad-based societal change (Plough & Krimsky 1987, p. 5).

The move towards government regulation of hazards (as opposed to total control) is not only linked to the rise of the nation state and industrialisation, but is also linked, in a temporal sense, to the successes of late 19th and early 20th century public health initiatives. Responsibility for decisions about, and regulation of, seemingly intractable health hazards came to rest with a professionalised bureaucracy and the scientific community (Plough & Krimsky 1987, p. 5; Rip 1991, p. 351).

Socially and culturally, these groupings became very different from the lay-public overtime. In addition to specialist education and regulatory roles these groups possessed linguistic conventions, processes of socialisation that further cemented their separation from the masses. In most cases the management of regulatory safety operates from within institutions (Heimer 1988, p. 512) with decisions relating to societal safety being made at a centralised, institutional level rather than at an individual or community level (Clarke 1988; MacLean 1982, p. 60). A further factor is that because of specialist training and their societal role the

Notes

1. Poggie is citing the work of Horton, R. (1960). Similarly, Australian Aboriginal people often described their 'lived' and 'spiritual' landscape in terms of safe and dangerous places. This form of meaning system is embedded within the cultural life of a people often sourced from a numinous reality.

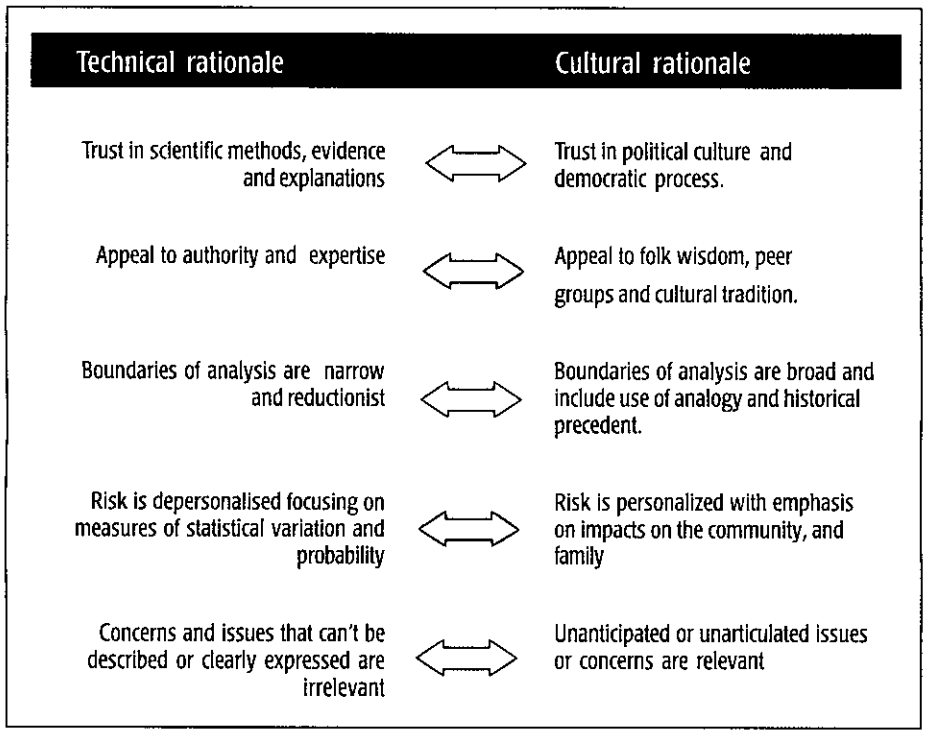

Figure 1: Technical versus cultural rationality (derived from Krimsky & Plough 1998).

activities of these elites became invested with scientific and decision making authority especially in the area of policy formation (Dietz & Rycroft 1987).

Along with these processes of professionalisation came preferred frameworks for problem definition, assessment and decision making that were based on particular preferred styles of thinking. For expert risk assessors, information of relevance was more likely to be expressed in technical terms and their approach to risk communication problems was to assume the inability of the public to understand technical knowledge (Bradbury 1989). For such a technical elite, the inability of a public audience to understand (accept) institutional risk estimates, may be seen as analogous to the situation faced by engineering students in their first semester: 'they are ignorant but well-intentioned, hard working but without a clue' (Beck 1992, p. 58). Of course if the public are really 'would-be' engineers then they need only to be filled with the requisite amount of technical detail. Then they would share the same understanding as the technical elite and all perceptual differences would dissolve.

A number of explanatory frameworks have been developed to examine important factors and symbolic dimensions of expert and public attitudes towards hazards and the risks they create (Plough & Krimsky 1987; Spangler 1982; Michael 1992). A definitive model identifies two broad thematic worldviews: a *technical* rationale and a *cultural* rationale. This model is displayed in *Figure 1*.

A technical rationality encompasses the position that risk can be studied independently of the social context in which it is embedded and experienced. A cultural rationale however, does not discount technical knowledge but seeks to incorporate it into a broader experience-based decision making framework. Both themes are valid within their own value systems but are potentially antagonistic.

For adherents to such a technical rationale the reliance on scientific frames of reference encompassing the certainty of technical knowledge would be likely. Such assumptions would be symptomatic of institutional blind spots reflecting an automatic devaluation of the contextual experience of risk. Technically focused frames of reference would miss a whole dimension of perceptual and evaluative criteria relevant to public concern (Wynne 1989b, p. 123).

These contrasting positions may be seen as symptoms of the differences between a personal experience of some reality and science's explanation of the same reality (Gifford 1986, p. 230). When communicating information about the nature of harm resulting from a technology or exposure scenario for example, 'technically focused' messages may be seen as representations of the facts as the communicators and assessors see them.

The notion of the experience of harm is of critical importance. While human reactions to high risk situations have been recognised as a socially created and defined phenomena (Beck 1992; Giddens 1990 & 1991; Renn 1992b; Clarke & Short 1993) little work exists offering a systematic assessment of the social and cultural dimensions in which threats are experienced.

Further, given the major differences between both groupings it might be conjectured that each group is responding to completely different phenomena.

The nature of hazard and risk (from semantics to practice)

It is suggested above that socialisation, the regulatory role itself and use of language varies significantly across both groupings. An analysis of the lexical roots of hazard and risk for instance, highlights wide semantic variation in language development over time. The derivation of hazard is attributed to an Arabic word *al-zahr* meaning 'the dice.' From this, the word *khatar* meaning to gamble was derived and in around 1100AD, the Spanish *azar* (a game of chance) was in usage. Linguistic diffusion was noted from Spanish to the French as *hasard* and then into English with similar meaning. Thus hazard, historically, has been linked with games of chance and outside direct human control. It has been associated with involuntariness and unforseeability (Ingles 1990, p. 69).

Risk is a more recent addition to the English language. Sources linking it to the low Latin *resecare*, alleged to mean 'to being shipwrecked' or the Greek *rhiza*, (reef), have been noted in a number of sources. Risk, however, is more likely to have originated from the Greek *riskos*, (a money chest) and then into Arabic as *rizq* (wealth) and as *al-rizq*, (a fateful windfall). From Arabic links have been established to Moorish Spanish as *arrisco* at around the 14th century. From around the year 1477, risk can be found in High German as *arreschq* and by 1518, as *risigio*, a precursor to the contemporary Germanic usage, *risiko* (Ingles 1990, p. 70).

A dominant semantic difference between risk and hazard is that the former had connotations of voluntariness and the latter, involuntariness. At a meta-level they can be differentiated into the notions of whether divine influence or humankind is the master of events (Ingles 1990, p. 69). Voluntary human control, as adventurousness was a feature of the meaning of risk. Thus we find in many forms of modern English usage the phrase 'to take a risk.'

Figure 2 is a representation of the analysis of the semantic roots of hazard and risk. Derived from Ingles (1990) it classifies effects on money (or things) and those that threaten life.

A further layer of classification on

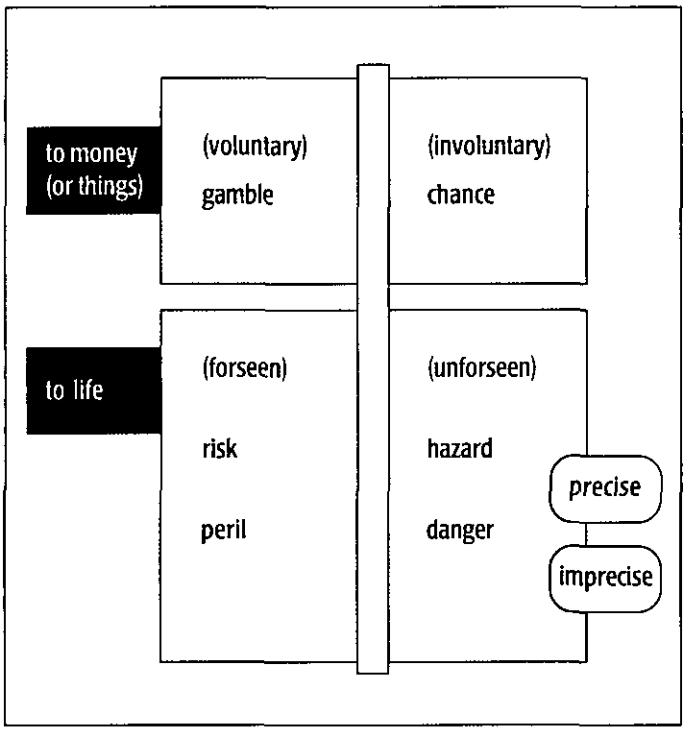

Figure 2: Etymology of risk and hazard (Ingles 1990).

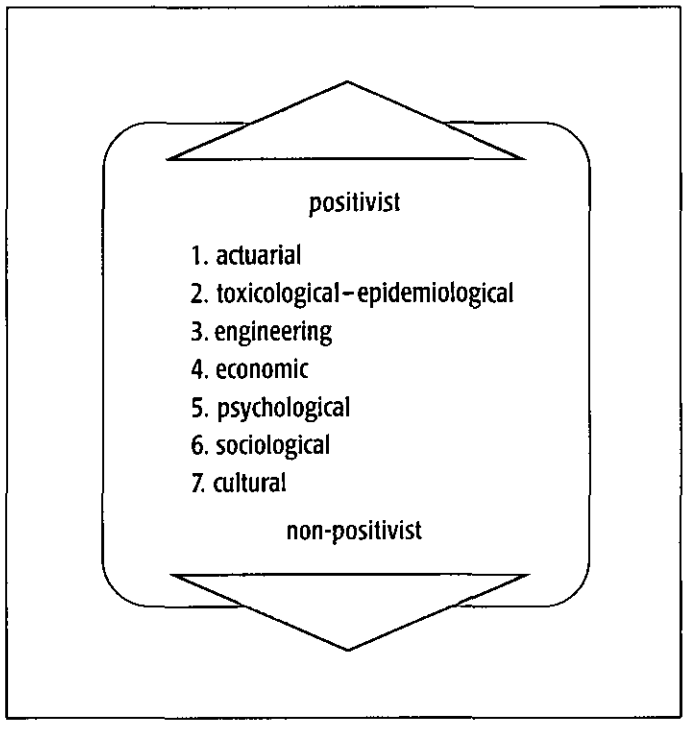

Figure 3: Classification of professional applications of risk (Renn 1992b).

money separates voluntary action (gamble) and involuntary action (chance). For life threatening events the framework extends further to list voluntary and involuntary categories (foreseen and unforeseen respectively), and precise and imprecise terms.

Figure 2 clearly shows the detailed semantic variation inherent in the language of risk and hazard. Beyond the obvious differences in preferred positions embodied in the technical and cultural worldviews shown above (*Figure 1*), variable usage of language adds a further dimension to the complexity of differences between regulator and the lay-public.

Empirical evidence exists suggesting that members of the public do not speak about risk in terms of its probabilistic connotations. De Marchi & Rota (1990, part IV) in a major European study of risk information needs for communities near hazardous industrial sites report that the public often think of risk as an amalgam of cause, as evidence or as an effect, all within a wider context that gives rise to the meaning of the hazardous event.

Making judgements about risk involves more than matters of probabilistic prediction (Smithson 1991a, p. 8). The use of mathematical processes will enhance manipulative and calculation power but at the expense of descriptive and contextual meaning for those involved or affected by some hazardous exposure. An important point in relation to knowledge about hazards and related harm is that a *measure* of risk may have little meaning if separated from the social and behavioural context in which risk is experienced and described.

It has been noted also by Otway & Wynne (1989, p. 141), that many of the early theoretical findings about risk communication were developed from studies into public risk perception that were in-turn *based on simplistic models of human* behaviour. These models obscured aspects of the interactions and contexts that define authentic social communication. For the public, mathematical expressions of risk can be like a foreign language. Douglas (1990, p. 4) also states that regulators (technocrats) prefer to use the term risk over danger because risk (as a metric), allows the calculative pretence of accuracy. Danger, which may be a more compatible description of a situation where risk (as a potential for harm) is experienced, does not however carry the aura of science.

While the epistemological and semantic approaches to risk issues shown in *Figures 1 and 2* define a comparative baseline for appreciating expert-lay person differences, consideration of the complexity of professional usage of risk adds further context.

A conceptual framework developed by Renn (1992b, p. 56), lists widely varying applications of risk and underlying conceptual bases. Each involves differences with respect to operational definition, application, epistemological status and derivation as well as academic and professional usage. *Figure 3* displays a graphic of these classifications.

The seven approaches form a continuum that covers the intellectual divide between positivist and non-positivist traditions. As conceptualised in items 1 to 3 of *Figure 3*, risk is a measured entity. The base unit of each item is an 'expected' value, a 'modelled' value, and a 'synthesised expected' value respectively (Renn 1992b, p. 56). Like any estimate however, such *measures are open to conjecture about* their inherent uncertainties. Estimates however are often given a status that is not warranted by their degree of accuracy. Such status might be created by political and bureaucratic need. There is often a tendency in regulatory authorities try to define risk in ways and contexts that make it appear controllable or at least manageable.

In *actuarial* mode, a risk may be expressed as a loss of goods or some expected or potential loss. In *epidemiological, toxicological* and *engineering* mode, risk is treated as compound functions involving probabilistic expressions of the occurrence of some negative event or phenomena. In these disciplines, risk is generally approached as a tangible phenomenon (ie. obvious losses or impacts on human health and/or ecosystems). Socially and culturally defined consequences are normally excluded from technically based assessments of risk or at the least discounted.

This narrow focus is both a strength and a weakness (Renn 1992b, p. 61). By limiting and reducing the terms of reference, the concept of risk becomes uni-dimensional and easier to operationalise. On the other hand, by focusing on notions of physical harm other related

consequences that people might find undesirable may be excluded. The *technical* viewpoint on risk derives from 'positivist' epistemologies and realist ontologies that treat risk as existing independently of those who experience it (Bradbury 1989). There has also been a tendency by past researchers within the technical framework to over emphasise nomothetic approaches to methodology. The conceptual approaches used in items 1 to 3 of *Figure 3* are inherently reductionist.

The *economic* perspective while still based on probabilities, enhances more formal technical approaches to risk by including broader definitions of unwanted consequences and by adding a social dimension related to these consequences (gains and losses) based on individual conceptions of utility (Renn 1992b, p. 61). This perspective entails the transformation of notions of physical harm or other adverse events into subjective utilities. This approach promotes techniques and instruments to measure and compare losses or gains in 'utility' from the choice of different options. Economic notions of risk are applied in questions of resource allocation, economic planning and related decision-making (Warner 1992, p. 5).

Within *psychological* perspectives on risk, subjective judgement is expanded in a number of ways. A focus may be placed on personal preferences with consideration of why and how people make judgements about risk (as a potential for harm). Many early psychological approaches to risk were based on expectancy value theories. These approaches assumed that people made judgements about possible future harm based on a rational comparison of the costs and benefits of engaging in certain health behaviours. Following these deliberations, they would then choose the path of maximal benefit (Adler *et al.* 1992, p. 232; Cleary 1987, p. 6). Arabie & Maschmeyer (1988, p. 301) suggest that such context-stripping approaches to human activities have little to offer towards an understanding of real world situations where the public react to actual danger or threats. Cognitive versions of risk perception have not been useful in predicting socially important behaviours such as self-protection. The social contexts within which behaviour occurs needs to be incorporated into theory and research design (Miletti *et al. 1975*, pp. 33–34).

Sociological approaches to risk study human reactions and attitudes towards hazards and the harm presumed to follow from exposure to them. There is more emphasis on consideration of the range of underlying beliefs and values that are incorporated into an individual's assessment of risk. This approach to risk starts from the premise that reactions to hazards are the result of (group-based) social processes and therefore are socially constructed (Renn 1992b, p. 67). Risk is not conceptualising as a physical phenomenon existing independently of the humans who assess and experience it. It focuses on the examination and identification of the context(s) of risk taking behaviour, the identification and explanation of public concerns about certain hazards and related risks and the representation of personal experiences in ways that may not be possible via technical representations of risk (Renn 1992b, p. 77).

Cultural approaches to risk emphasise personal and culture-based values and the insight they can provide in the understanding of risk perceptions and policy formation (Renn 1992b, p. 72). The expression of worldviews as forms of risk perception was a major change in theoretical approaches to risk as the concept matured and it moved reactions to harm beyond the range of the individual (Pidgeon 1992, p. 113).

The cultural approach to risk brings insight into debates on policy formation by establishing the existence of very heterogeneous groups of stakeholders. It changes the focus of attention from the previously insurmountable position held by regulatory authority to that of the perceiver of harm. More emphasis for example would be placed on the essential role of participation of the recipients of both the benefits and costs of a technology in making decisions about the societal acceptability of the technology (Bradbury 1989, p. 391). From the cultural perspective arguments about hazardous technologies are not just concerned with choosing a safer technology or a more stringent standard over another. They are linked to fundamental questions about the social and political meaning of technologies and their broader societal implications (Dake 1992, p. 23).

In any consideration of cultural factors and social meaning language and communication are closely linked. It has been noted by Otway & Wynne (1989, p. 141) that much of the research and theoretical findings about risk communication were developed from studies into public perception of risk that were based on simplistic models of human behaviour. Such models obscure aspects of the social interactions and contexts that define authentic communication about risks and hazards. For the public, mathematical expressions of risk can be like a foreign language. Douglas (1990, p. 4) also states that regulators prefer to use the term risk over danger because risk (as a metric), allows the calculative pretence of accuracy. Danger, which may be a more compatible description of a situation where risk (as a potential for harm) is experienced, does not carry the same aura of science.

However, like information, risk is not a thing. Risk as a theoretical construct, is of prime importance to any examination of human behaviour in dangerous situations. Three meta-theoretical positions on risk emerge from an examination of the literature. They are shown in *Figure 4*.

In each theme, *risk* derives from quite different ontological and epistemological bases. As a reductionist phenomenon it is treated as extra-human and context free. Risk in this form is generally expressed as a numerical measure (often a probability). This usage and expression is valid for epidemiological measures and form an integral part of the regulation of population health. Similarly, in 'actuarial' settings the creation of frequency tables for determining the probability of monetary losses or the calculation of insurance is also a valid use. Generally where there is a focus on the analysis of the likelihood of effects on things, reductionist approaches to risk as a cognitive tool are philosophically sound.

A tension exists between *reified* and *experiential* notions of risk. This is very evident in research on risk analysis and societal reaction to situations of threat that emphasise the well-defined differences that exist between institutional regulators and the public. This natural separation carries with it definite adversarial potential. Trust and credibility issues emerge as key factors in such situations where differences between the modern state and its constituents occur. Often concerns are about purported health impacts from waste dumps or treatment facilities, sites of illegal dumping of toxic material, industrial accidents or concerns about proposed industrial developments. Some sources of concern may be less obvious or tangible such as chemical residues in food or water supplies (Kasperson & Kasperson 1991).

While human reactions to risks (threats - unrealised harm) have been recognised as a socially created and defined phenomena (Beck 1992; Giddens 1990 & 1991; Renn 1992b; Clarke & Short 1993) institutional response to cases of public concern historically has been to discover the scope of public misunderstanding or misperception of the *real* risk. Once the level of misapprehension has been gauged and its

Risk	as .. reified	as .. experienced	as .. metaphor
	a technical/ rational phenomenon	an individual or group phenomenon	an societal or cultural phenomenon
	a historical extra-human		

Figure 4: Thematic approaches to risk.

Category	Associated Images
Dangerous	Toxic, hazardous,deadly, destruction, accidents, poisonous, explosive, kill, harmful, Bhopal, cancer, bad
Pollution	Love Canal, greenhouse effect, smelly, air pollution

Figure 5: Symbolic associations with the word chemical (Slovic 1992, p. 148).

extent mapped out a common institutional reaction has been to treat it with risk communication. It seems logical to assume that if a comprehensive appreciation of the nature of public concern about an issue is not available then attempts to communicate away these worries may be at best ineffective and inappropriate. At worst, presumptive attempts to educate the public could add to what may already be a *situation of distrust and diminishing* confidence.

Notions of *risk* as a metaphor are evident in the work by Beck (1992) and Giddens (1990 1991) and aspects of work by Sontag (1988). Mary Douglas' use of *risk* as danger and subsequent use in analysis of policy frames is also an example of the metaphorical theme in risk research.

More easily recognised examples of *risk* as metaphor reside in the symbolic status of places such as 'Bhopal,' 'Chernobyl' and 'Three Mile Island.' *Figure 5* is derived form the work of Slovic (1992) and examines how images of an industry (in this case chemical), can become negatively stigmatised.

The risk-as-metaphor theme seeks to capture elements of an emergent societal reaction to an increasingly hazardous world. It is also associated with social perceptions of safety and threat and is further linked to the social impacts from both slow-burn and sudden technical disasters. The source of harm (technology) becomes imbued with risk as does, in many cases, the corporate world and related regulatory and bureaucratic institutions.

Social and cultural factors: risk perception in the real-world.

While psychometric methods used in risk perception generally can only provide an outsider's view of the public experience of danger, they have provided useful explanatory frameworks about how people assess risk and think about related issues. *Figure 6* displays a generic set of assessment criteria derived from this research tradition.

The list of attributes (mental schemas) listed in *Figure 6*, are considered influential in personal assessment about, or outcomes of, contact with a range of natural or technical hazards. Some understanding of the danger myths of modern society can be gained from these cognitive 'rules of thumb'. While psychometric methods can identify generic decision-making criteria associated with a range of behavioural responses they cannot uncover why such associations exist or the social contexts within which they are important. Furthermore, while these behavioural factors are obviously useful, the influence of information on personal decision-making (including sources and contexts) remains unaddressed in many approaches to risk perception (Dunwoody & Neuwirth 1991, p. 18). An overall critique of psychometric approaches to risk perception is the absence of a credible coverage of the experience of danger in the real world.

A key difference between studies of risk perception focused on 'what if' scenarios and real world disaster research is the existence of real threat in the latter. Threat may be seen as having two components (Kasperson & Pijawka 1985, p. 15):

- a degree of danger (perceived or real)
- some notion of control over that danger (i.e. choice of exposure or contact)

There is evidence that a belief that you have been exposed to a toxic substance, even if you have not, is sufficient to cause a traumatic stress response (Baum 1987, p. 31). Such beliefs may also become a *threat to health (Burdge 1989, p. 96).* For example, the effects of stress among residents living near the Three-Mile-Island (TMI) nuclear reactor persisted for a number of years after the reactor accident. A survey of TMI residents in 1983 reported a number of trauma

High loss of life accidents major industrial accidents	worse	**Low fatality rate accidents** road accidents
Risk to non-beneficiaries residents near a nuclear plant, the crew of a rescue lifeboat	worse	**Risk to beneficiaries** workers at the plant, fishermen
Involuntary risk poisoning from contaminated food	worse	***Voluntary risk*** over-indulgence of tobacco or alcohol
Imposed risk reduction of operational fire fighters	worse	**Self-chosen risk** using a vaccine with a chance of side-effects
Risk evaluated by interest groups reports based on self-assessment by an industry body	worse	**Risk evaluated by unbiased groups** a Royal Commission or similar public enquiry

Figure 6: Criteria for personal risk assessment (Sprent 1988 & Sandman 1989).

symptoms such as psychic numbing, hopelessness, feelings of being trapped by the situation and a lack of peace of mind. These feelings continued to exist a number of years after the event although concern about radioactive releases and other hazards linked to the reactor faded within a year of the accident (Bell *et al.* 1990, pp. 209, 211).

Many types of environmental contamination are both phenomenologically and medically invisible. Radiation is invisible, silent and has no odour. It may be impossible for community members to determine, by themselves, whether they have been exposed, or their degree of exposure. The nature and fact of their exposure may also be invisible to physicians treating them (Vyner 1988, p. 13) and to regulatory institutions. It might not matter that the suggested degree of exposure is low. If people believe they have been exposed and there is evidence of contamination in the community, then that is enough to cause concern. During the TMI accident there was little residents could do themselves, to reduce exposure. Also given the severity and 'dread' nature of the hazard itself (radio-activity), the lack of any personal control over the situation would be an obvious cause of anxiety and emotional disturbance (Kasperson & Pijawka 1985, p. 15).

A further issue is that social and community responses to natural hazards have been shown to differ from that seen for technological hazards. After a natural disaster, a 'therapeutic community' response is a well-known phenomenon. This community response often entails spontaneous, altruistic behaviour among victims and non-victims for mutual support and to replace institutional resources or infrastructure that may have been destroyed (Perry 1983). After a technological disaster, especially if characterised by prolonged exposure to harmful agents, the 'therapeutic community' is not a regular occurrence. In such cases there often seems to be a feeling that the 'community' has been destroyed and cannot be rebuilt (Kasperson & Pijawka 1985, p. 16). It may be that a lack of the self-help response derives from a realisation that they've lived unknowingly, in danger. Their confidence in the safety of their surroundings is destroyed by unfamiliar and unexpected hazards.

Controversies about contamination promote a type of cultural stress. This cultural disruption is centred on the shared community belief (confidence) about the safety of their surroundings. Community groups may disagree about a range of minor issues but they are likely to continue to live and invest time and money in their homes if there is a mutual trust (and confidence) and the air and water is clean and it is safe to live there. Toxic chemicals leaching into ground water or asbestos fibres floating in the air do not damage buildings or flatten houses but they seem to destroy the *safety* of community life (Kroll-Smith & Couch 1993, p. 87).

The potential harm of technological hazards challenge the human social and cultural need for safety and normality in life. Furthermore, technology is not supposed to breakdown and technological catastrophes are never supposed to happen (Baum 1987, p. 36).

People in general make sense of their world in collaboration with other people in social settings and in social contexts. Therefore notions such as safe and hazardous are consensually determined *meanings* not reified phenomena (Douglas 1985, p. 34).

A social constructivist view on the perception of risks and threats would hold that although individuals experience psychosocial stress, it arises from within a social context and can be intensified or attenuated within such a context. A public reacting to disastrous events is not acting in response to physical factors alone, but also to what those events mean and represent as socially constructed and experienced crises (Kroll-Smith & Couch 1993, p. 81).

In a practical sense, studies of communities affected by toxic exposures are not examining risk perceptions. A more appropriate term is threat beliefs. Kroll-Smith & Couch, (1993, p. 87) after studying a number of communities affected by major industrial accidents identified four themes relevant to such belief systems. These themes varied depending on type of contamination, social and historical factors and cultural differences across communities, but they are useful starting points. They were:

- a certainty that the environment or parts of it are now dangerous and should be avoided
- a belief that the community is being poisoned
- a conclusion that they (as victims) could expect little empathy or assistance from neighbours or the Government
- a belief that escape and/or relocation are the only reasonable means to avoid the danger.

Adherence to the content of threat beliefs in uncertain situations confers a form of certainty to experiences. Technical experts may disagree over the presence of toxic chemicals in a community but residents are certain that they are there. Such certainty also extends to ambiguous factors or events related to the hazards in question (Kroll-Smith & Couch 1993, p. 85).

Residents at the 'Love Canal' organised themselves around shared beliefs about the amount and nature of the danger they were facing and their rights for institutional support as taxpayers (Levine 1982). The inhabitants of Centralia, Pennsylvania responded to the impacts of a fire in an underground mine on the basis of linked ideas about amounts and types of danger faced by families (Kroll-Smith & Couch 1987& 1990). Residents near the TMI nuclear plant also developed coherent beliefs about safety and trust in government regulators after the event (Vyner 1984).

A general lack of familiarity with the hazards (and the nature of the threat) may also promote a greater reliance on scientific based regulatory institutions over friends, relatives or even supportive strangers (Kasperson & Pijawka 1985, p. 16). The social communality (therapeutic community) seen in natural disasters may not occur because unaffected people feel that either the geographical setting is contaminated (dangerous) or the effected people (victims) are not safe. Socio-technical disasters tend to affect the long-term psychosocial health of people more than natural hazards because they do more than just damage and wreck things. They contaminate, taint, and pollute things. Moreover, they scare people (Kroll-Smith & Couch 1993, p. 80).

Exposed people or contaminated communities lose their 'purity'. They become dangerous to a wider society[2] and may have become stigmatised. For community members who are known to have been exposed to toxic substances ritualised avoidance behaviour by neighbours, friends or even relatives inform the exposed that they are now beyond the boundaries of a pure and safe society. Ongoing contact with them then is to risk impurity and danger.

Victims realise that they are no longer part of a traditional community that provides support and sympathy (Kroll-Smith & Couch 1993, p. 83). Such breakdowns in social support may be seen as leading to a form of alienation. Related issues such as social isolation (lack of meaningful contact with others) and powerlessness (little control over life events) increase feelings of being at mercy

of forces beyond their control. Loss of a sense of personal control has also been identified as important where victims feel powerless to adequately protect their families and themselves from harm (Mirowsky & Ross 1989).

Community members are threatened by a physical world that once provided security and alienated from the social contexts in which they once found meaning and comfort (Kroll-Smith & Couch 1993, p. 84). Personal apprehension is often felt among individuals in contaminated communities. Essential questions are likely to remain unanswered such as 'What part of the environment is contaminated,?' 'Is it really dangerous,?' 'How should I behave in these circumstances?' (Kroll-Smith, & Couch 1991, p. 363).

A range of literature sources supports this notion of alienation. For example, links between social and psychological distress and high levels of alienation (Mirowsky & Ross 1986), powerlessness and demoralisation (Wheaton 1980), lack of coping ability (Wheaton 1983), depression (Garber, Miller & Seaman 1979) and problem drinking (Seeman, Seeman & Budros 1988).

There are also links between social reactions to hazards and classical notions of anomie. While Durkheim's use of anomie was noted for its association with deviant human behaviour, he also applied it in relation to negative human reactions and major social difficulties with changes in the modern world, that resulted in a sense of aimlessness and purposelessness (Giddens 1989, p. 692). Normlessness has also been correlated with instances of mistrust, paranoia, brooding and worrying in wider social settings (Mirowsky & Ross 1983). What may be discernible among impacted individuals and groups in contaminated communities is a form of social dysfunctioning manifesting as a form of 'emergent anomie' (Kroll-Smith & Couch 1993, p. 85).

The realisation of a generalised loss of safety and certainty and wider psychogenic effects are key issues in socio-technical incidents. Giddens (1991, pp. 126,127) described a social condition he referred to as a 'world of normal appearances' in which life becomes routinised within the social contexts of daily life. Life is predictable and thus 'normal.' Within this normality there is a sense of trust in (expectation of) the absence of unexpected calamity and danger. This trust is learned and reinforced by from habit and personal experience.

The basis of this condition is derived from phenomenological sociology and is based on the theoretical concept of the *Umwelt*. The original theoretical meaning of *umwelt* entailed an individual's own understanding of the world around them (their surroundings), based their experiences in that world (Shutz 1970, p. 16). The interpretation of *umwelt* used here, relates to a habituated (taken for granted) personalised sense of safety space that people carry around with them and is transferred to their immediate environment (Goffman 1971, p. 255). Giddens theorised about a 'moving world of normality' that people carry around with them. Thus a sense of safety requires the participation of other people in a consensual, cooperative context (1989, p. 128). So if, as many theorists have stated, risk is socially constructed then this sense of safety is also likely to be socially constructed.

It could be argued that the *umwelt* of residents in affected communities has been shattered by the occurrence of some acute technological threat or a realisation of having lived with unsuspected or emergent danger. What results may be a form of critical incident stress.

Similar reactions have been found in studies of communities affected by industrial accidents or other forms of toxic pollution. For example toxic contamination of community water supplies in Woburn, Massachusetts (Brown 1987, 1992 & 1993); sheep farms contaminated by radioactive fallout from the Chernobyl nuclear accident (Wynne 1989) and chemical contamination at Love Canal in Niagara, New York (Fowlkes & Miller 1987). All of these events involved both temporary and permanent disruption to normal community life.

The degree of risk faced by people and communities in such situations does not have to be statistically significant before political action is required. The trigger for action should not be an increased incidence of some disease, or evidence of significant exposure to contamination but consideration of the question of whether a reasonable person would feel safe in such a community and continue to be confident about continuing to live there (Couto 1985).

Conclusion

This paper has examined an important factor that can both enhance and detract from promoting community safety—the distance between the beneficiaries of regulation and regulatory institutions. This chasm of distrust and disbelief is one of the most significant problems relating the regulation of potential health impacts from industrial technology in recent times (Otway & von Winterfeldt 1982, p. 247; Slovic 1993) and in a broader sense, community safety.

Community interest in safety may be driven by a belief that modern life is riskier than in the past. Issues such as pollution from industry, food safety, contamination of water supplies or air pollution are often cited as contributing not only to an increase in the likelihood of harm and disease in society, but as symbols of the increasing hazardousness of the modern world.

But is our goal Community Safety or Safer Communities? As a societal outcome Community Safety can be sought via efficient and effective regulation at an institutional level. Associated with this regulation must be similarly high standards of risk management applied at the community level.

The establishment of safer communities however, is a different matter. Before this can be sought as a goal, determinations must be made about what safety means to the communities themselves. To do this, institutional regulators must ensure that use of their expertise does not promote inflexibility in understanding the needs and world-views of the public.

A core requirement would seem to be an understanding that becoming better safety regulators, from a technical perspective, is not enough and is unlikely to return significant improvements. What must occur is a greater understanding of how ordinary people living ordinary lives make sense of, and cope with, the uncertainties inherent in the modern world. If both safety regulation and enhanced understanding can be achieved the result is a reduced likelihood of harm, and an improved capacity to support real and sustained community recovery when chaos emerges from normality.

References

Adler N.E. *et al.* 1992, 'Risk Taking and Health', chpt. 8 in *Risk-Taking Behaviour*, ed. Yates J.F., John Wiley & Sons, Chichester, pp. 231–252.

Arabie P. & Maschmeyer C. 1988, 'Some Current Models for the Perception and Judgement of Risk', *Organisational Behaviour and Decision Processes*, Vol. 41, pp. 300–329.

Baum A. 1987, 'Toxins, Technology and Natural Disasters in Cataclysms, Crises

Notes

2. This experience may be a modern analogue to Mary Douglas's work on taboo (see Douglas & Wildavsky 1982)

and catastrophes', *Psychology in Action*, American Psychological Association.

Beck U. 1992, *Risk Society—Towards a New Modernity*, Sage Publications, London.

Bell P.A. *et al.* 1990, *Environmental Psychology*, 3rd ed., Holt, Rinehart & Winston Inc.

Bradbury J. A. 1989, 'The Policy Implications of Differing Concepts of Risk, *Science Technology & Human Values*, Vol. 14, No. 4.

Brown P. 1987, 'Popular Epidemiology: Community Response to Toxic Waste—Induced Disease in Woburn, Massachusetts', *Science, Technology and Human Values*, Vol. 12, Nos. 3 & 4, pp. 78–85.

Brown P. 1992, 'Popular Epidemiology and Toxic Waste Contamination: Lay and Professional Ways of Knowing', *The Journal of Health and Social Behaviour*, Vol. 33, pp. 267–281.

Brown P. 1993, 'When the Public Knows Better: Popular Epidemiology Challenges The System', *Environment*, Vol. 35, No. 8, pp. 16–41.

Burdge R. 1989, 'Utilising Social Impact Assessment Variables in the Planning Model', *Impact Assessment Bulletin*, Vol. 8, Nos. 1 & 2, pp. 85–98.

Clarke L. & Short J. F. 1993, 'Social Organisation and Risk: Some current controversies', *The Annual Review of Sociology*, Vol. 19, pp. 375–399.

Clarke L. 1988, 'Explaining choices among technological risks', *Social Problems*, Vol. 35, No. 1, pp. 22–35.

Cleary P. D. 1987, 'Why people take precautions against health risks, in *Taking Care (Understanding & Encouraging Self-protective Behaviour)*, ed. Weinstein N.D., Cambridge University Press.

Couto R. A. 1985, 'Failing Health and New Prescriptions: Community-based Approaches to Environmental Risks', in *Current Health Policy Issues and Alternatives: An Applied Social Science Perspective*, ed. Hill C.E., University of Georgia Press.

Covello V.T. & Mumpower J. 1985, 'Risk Analysis and Risk Management: An historical perspective', *Risk Analysis*, Vol. 5, No. 2, pp. 103–120.

Dake K. 1992, 'Myths of Nature: Culture and the Social Construction of Risk', *The Journal of Social Issues*, Vol. 48, No. 4, pp. 21–37.

De Marchi B. & Rota E. 1990, *Risk Information Needs of Communities near Seveso Sites: A pilot study*, Report EUR 12887 EN, Joint Research Centre of the Commission of European Communities, ISPRA.

Dietz T. M. & Rycroft R.W. 1987, *The Risk Professionals*, Occasional Report #14, Social Research Perspective's, Russell Sage Foundation, New York.

Douglas M. & Wildavsky A. 1982, *Risk and Culture—An essay on the selection of technical and environmental dangers*, University of California Press, Berkeley.

Douglas M. 1990, 'Risk as a forensic resource', *Daedalus*, Fall issue, pp. 1–6.

Dunwoody S. & Neuwirth K. 1991, 'Coming to terms with the Impact of communication on scientific and technological risk judgements', in *Risk Business*, eds. Wilkens Patternson, MacMillan.

Dunwoody S. & Neuwirth K. 1991, 'Coming to terms with the Impact of communication on scientific and technological risk judgements', in *Risk Business*, eds. Wilkens Patternson, MacMillan.

Fowlkes M. R. & Miller P.Y. 1987, 'Chemicals and Community at Love Canal, in Johnson', in *The Social and Cultural Construction of Risk*, eds. B.B. & Covello, V.T., D. Reidel Pub. Co.

Garber J., Miller W.R. & Seaman S.F. 1979, 'Learning helplessness, stress, and the depressive disorders', in *The psychobiology of the depressive: Implications for the effects of stress*, ed. Depue R.A., Academic Press, New York, pp. 335–363.

Giddens A. 1989, *Sociology*, Polity Press.

Giddens A. 1990, *The Consequences of Modernity*, Polity Press.

Giddens A. 1991, *Modernity and Self-Identity (Self Society in the Late Modern Age)*, Polity Press.

Gifford S. M. 1986, 'The Meaning of Lumps: A Case study of the ambiguities of Risk', in *Anthropology and Epidemiology*, eds. Janes, C. R. et al., D. Reidel Pub. Co., Dordrecht.

Goffman E. 1971, *Relations in Public (Microstudies of the Public Order)*, Allen Lane.

Heimer C.A. 1988, 'Social Structure, Psychology, and the Estimation of Risk', *The Annual Review of Sociology*, Vol. 14, pp. 491–519.

Horton R. 1960, 'A definition of religion and its uses', *The Journal of the Royal Anthropological Institute*, Vol. 90, pp. 201–225.

Ingles O. 1991, 'A linguistic Approach to Hazard, Risk and Error', in *New Perspectives on Uncertainty and Risk*, eds. Handmer J. *et al.*, Centre for Resource and Environmental Studies, Australian National University, and Australian Counter Disaster College Natural Disasters Organisation, pp. 66–78.

Kasperson R. E. & Pijawka K. D. 1985, 'Societal Response to Hazards and Major Hazard Events: Comparing Natural and Technological Hazards', *Public Administration Review*, Vol. 45, pp. 7–18.

Kasperson R.E. & Kasperson J. X. 1991, 'Hidden Hazards', in *Acceptable Evidence - Science and Values in Risk Management*, eds. Mayo D.G. & Hollander R.D., Oxford University Press, New York.

Kasperson R.E. 1987, 'Trust and Credibility: The Central Issue? (A Panel Discussion)', in *Risk Communication*, proceedings of the National Conference on Risk Communication, Washington, D.C., Jan 29-31, 1986, eds. Davies J. C. Covello V.T. & Allen F.W., The Conservation Foundation, Washington, DC.

Krimsky S. & Plough A. 1988, *Environmental Hazards: Communicating Risks as a Social Process*, Auburn House, Massachusetts.

Kroll-Smith J. S. & Couch S. R. 1991, 'What is a Disaster?: An ecological-symbolic approach to resolving the definitional debate', *The International Journal of Mass Emergencies*, Vol. 9, No. 3, pp. 355–366.

Kroll-Smith J. S. & Couch S. R. 1993, 'Technological Hazards: Social responses as traumatic Stressors', in *International Handbook of Traumatic Stress Syndromes*, eds. Wilson J.P. & Raphael B., Plenum Press, New York.

Levine A. G. 1982, *Love Canal: Science, Politics, and People*, Lexington Books, MA.

MacLean D. 1982, 'Risk and Consent: Philosophical Issues for Centralized Decisions', *Risk Analysis*, Vol. 2, No. 2, pp. 59–67.

Michael M. 1992, 'Lay Discourses of Science: Science-in-General, Science-in-Particular, and Self', *Science, Technology & Human Values*, Vol. 17, No. 3, pp. 313–333.

Miletti D. S., Drabek T. E. & Haas J. H. 1975, *Human Systems in Extreme Environments: A sociological perspective*, Institute of Behvioural Science.

Mirowsky J. & Ross C. E. 1989, *Social Causes of Physiological Distress*, Aldine de Gruyter, New York.

Otway H. J. & Simms D.L. 1987, 'Criteria for Technological Choice', *Public Administration*, Vol. 65, Summer, pp. 131–143.

Otway H. J. & von Winterfeldt D. 1982, 'Beyond Acceptable Risk: On the Social Acceptability of Technologies', *Policy Sciences*, Vol. 14, pp. 247–256.

Otway H. J. & von Winterfeldt D. 1982, 'Beyond Acceptable Risk: On the Social Acceptability of Technologies', *Policy Sciences*, Vol. 14, pp. 247–256.

Otway H. J. & Wynne B. 1989, 'Risk Communication: Paradigm and Paradox', *Risk Analysis*, Vol. 9, No. 2.

Perry R.W. 1983, 'Environmental Hazards and Psycho-pathology: Linking Natural Disasters and Mental Health', *Environmental management*, Vol. 7.

Pidgeon N. et al. 1992, 'Risk Perception', *Risk Assessment, Perception and Manage-*

ment, The Royal Society, London, pp. 89–134.

Plough A. & Krimsky S. 1987, 'The Emergence of Risk Communication Studies: Social and Political Context', *Science Technology and Human Values*, Vol. 12, Nos. 3 & 4, pp. 4–10.

Poggie Jr. J. R. 1980, 'Ritual Adaptation to Risk and Technological Change in Ocean Fisheries: Extrapolations from New England', *Anthropology Quarterly*, Vol. 53, No. 2.

Renn O. 1992, 'Concepts of Risk: A Classification', Chpt. 3 in *Social Theories of Risk*, eds. Krimsky S. & Golding D., Praeger, pp. 53–79.

Rip A. 1991, 'The Danger Culture of Industrial Society', Ch. 15 in *Communicating Risks to the Public — International Perspectives*, eds. Kasperson R.E. & Stallen P.J.M., Kluwer, Dordecht.

Sandman P. M. 1989, 'Hazard versus Outrage in the Public Perception of Risk', in *Effective Risk Communication — The role and responsibility of government and non-government organisations*, eds. Covello V.T., McCallum D.B. & Pavlova M.T., Plenum Press, New York.

Seeman M., Seeman A. Z. & Budros A. 1988, 'Powerlessness, work, and community: A longitudinal study of Alienation and Alcohol Use', *Journal of Health and Social Behaviour*, Vol. 29, pp. 185–198.

Shutz A. 1970, *On Phenomenology and Social Relations: Selected Writings*, ed. Wagner H.R., Univeristy of Chicago Press.

Slovic P. 1992, 'Perception of Risk: Reflections on the Psychometric Paradigm', Ch. 5, in *Social Theories of Risk*, eds. Krimsky S. & Golding D., Praeger, pp. 117–152.

Slovic P. 1993, 'Perceived Risk, Trust and Democracy', *Risk Analysis*, Vol. 13, No. 6, pp. 675–682.

Smithson M. 1991, 'Managing in an Age of Ignorance', in *New Perspectives on Uncertainty and Risk*, eds. Handmer, J. et al., Centre for Resource and Environmental Studies, Australian National University, and Australian Counter Disaster College Natural Disasters Organisation.

Sontag S. 1988, *AIDS and its metaphors*, Penguin, London.

Spangler M. B. 1982, 'The Role of Interdisciplinary Analysis in Bridging the Gap Between the Technical and Human Sides of Risk Assessment', *Risk Analysis*, Vol. 2, No. 2, pp. 101–114.

Sprent P. 1988, *Taking Risks (The Science of Uncertainty)*, Penguin, UK.

Vyner H. M. 1988, *Invisible Trauma*, Lexington Books, Lexington.

Warner F. 1992, Introduction, Chpt. 1, in *Risk: Perception and Management*, A Report of a Royal Society Study Group, The Royal Society, London.

Wheaton B. 1980, 'The sociogenesis of psychological disorder', *Journal of Health and Social Behaviour*, Vol. 21, pp. 100–124.

Wheaton B. 1983, 'Stress, personal coping resources, and psychiatric symptoms, *Journal of Health and Social Behaviour*, Vol. 24, pp. 208–229.

Wynne B. 1989, 'Building Public Concern into Risk Management', Chpt. 8 in *Environmental Threats: Perceptions, Analysis and Management*, ed. Brown J., pp. 118–133.

Wynne B. 1987, *Risk Management and Hazardous Waste (Implementation and the Dialectics of Credibility)*, Springer-Verlag, Berlin.

Conference Announcement

5th New Zealand Natural Hazards Management Conference 2002

Te Papa, Wellington, New Zealand,
14-15 August 2002

Optional Field Trip: 16 August 2002

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

Target Audience

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

Theme

The conference will provide a forum to discuss the integration of hazard information into effective risk management, including:

- applying hazard information to best practice planning
- exploring new technologies — advances in science application
- natural hazard mitigation for industry
- creating resilient communities through integrating science and practice

Conference Format

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

Pre conference short courses

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

Post conference Field Trip

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

Registration

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

More information

Diane Tilyard, Wairakei Research Centre
Institute of Geological & Nuclear Sciences
Private Bag 200, TAUPO
Phone: 07 374 8211; Fax: 07 374 8199
Email: d.tilyard@gns.cri.nz

www.gns.cri.nz/news/conferences/hazconf2002.htm

Authors contact details

Dr Paul Barnes
Manager (Corporate Risk)
Corporate Performance Division
Department of Primary Industries (QLD)
Floor 7, Primary Industries Building
80 Ann Street (GPO Box 46) Brisbane 4001
phone: 07 3239 3921
Fax: 07 3239 6971
Mobile: 0419 672 788
Email: BarnesP@prose.dpi.qld.gov.au

This article has been refereed