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DISASTER RESPONSE: THE PERCEPTION OF THE THREAT AND ITS INFLUENCE ON COMMUNITY DECISION ON INSURANCE

Neil R. Britton, G. E. Kearney and K. A. Britton

Department of Behavioural Sciences
James Cook University of North Queensland

1 Introduction

The modern phenomenon of insurance as a commercially obtainable consumer item, especially in the variety of packages that are available today, is one which has not received substantial attention in the behavioural sciences literature. Given its assumed significance as one of the keys toward a viable damage-mitigation programme, particularly by natural hazard researchers, it is a little surprising that insurance has not received greater preeminence within social science research. However, studies that have dealt with aspects of insurance and natural disaster have not been entirely neglected; a reasonable case could be presented to argue that this area of studies is becoming a 'growth' area at present (see, for example, the recent UNDRO International Working Group on Natural Disaster Insurance, Geneva 1983; and the continuing work of the Wharton School at the University of Pennsylvania).

'Insuring Man' as a phenomenon is a product of the 20th Century. Although insurance was not uncommon prior to this it was the 20th Century which saw a strong awakening in individuals of the need to insure against possible loss and catastrophe. Traditional societies in their way contributed to the cohesion of the group by effective participation at the tribe, clan, and lineage level. Man spent a great deal of time engaging in reciprocal relationships and rituals. These became his insurance against having to face disaster or hazard unsupported by his immediate group. He participated with significant others in making judgements and

holding values. He sought group approval for his actions and consolidated his position in his group by a variety of participatory exchanges. As such he could ensure that at a time when his house may have burned or his roof removed by high winds that there would be adequate help to provide replacement for him and his family:

> "No villager thinks of himself apart from his family. He rises or falls with it ... we need the strength of the family to support us ... That man is to be pitied who must stand alone against the dangers, seen and unseen, which beset him. Our families are our insurance. When a man falls ill, he knows that his family will care for him and his children until he is able to earn again. And they will be catered for without a word of reproach. If a man dies, his widow and children are sure of the protection of a home."
>
> (Wiser and Wiser, 1951: 160; in Foster, 1973: 39)

The biggest single disaster that can happen in a traditional society is that group support is withdrawn from an individual and he has to face the vicissitudes of the world by himself. Today, it is possible to purchase a wide variety of insurance against a large range of chance outcomes independently of the immediate and the extended family arrangements.

Although perceptual processes have been studied extensively by psychologists for more than a hundred years, little has been done in the area of hazard perception. Hazard perception (as a field of research) is concerned primarily with the way in which the individual cognitively organises, using both memory and experience, a multitude of complex perceptions, rather than a traditional view of perception where the individual identifies, discriminates, recognises and judges objects.

Bell, Fisher and Loomis (1978) summarize a number of factors "found to be important in hazard perception". These include the contributions of geographers, such as Burton, Kates, Oliver, Saarinen and White, who have been active in this area (see Burton and Kates, 1964; Burton, Kates and White, 1968; Kates, 1976; Oliver, 1978, 1980; Saarinen, 1969). Bell and his colleagues suggest three factors which appear to have significance. They are the crisis effect, the levee effect, and adaptation: The crisis effect refers to the fact that perception of a disaster is greatest during and immediately following its occurrence but greatly dissipates between disasters. The levee effect pertains to the fact that once measures are taken to prevent a disaster, people tend to settle in around the protective mechanism. The third factor involved in hazard perception is adaptation. Just as we adapt or habituate to a noise or odour, so too do we adapt to threats of disaster. Apparently, we can hear so much about a hazard that it no longer frightens us (Bell, Fisher and Loomis, 1978: 34).

It should be possible to posit a model of man who purchases insurance to protect himself and his assets against loss from some possible future event. Foster (1983) suggests it is possible to study the action that an individual will take as a rational approach to deliberate risk management. He suggests a number of 'safety delivery systems', and presents these as a model for reducing vulnerability to natural hazards. However, the concept of 'rational man', developed by economists to explain economic behaviour, has been rejected by a number of writers, including influential economists. Economists have attempted to demonstrate that wider explanations for economic man must be found. Simon (1957), for example, has argued that the classical conception of rationality that is based on unlimited memory and computational capacity should be replaced by a more 'realistic' form of rationality which is limited by the persons ability to process information. Simon's argument suggests that in many real world decision problems the amount of information that should be processed and evaluated is so vast that expected utility maximization is practically impossible. The essential simplification built into Simon's model can be described as the replacement of the maximization principle by a satisficing principle.

The question of man's rationality in other spheres of human social life has not received the same degree of debate as that witnessed within economics, possibly due to the fact that economists had tended to define the concept more narrowly that other academicians. However, psychologists in particular still ask how rational man really is in making decisions. Krech, Crutchfield and Ballachey (1962) argue that -

> "First, human action is motivated, or goal directed; second, human action is integrated - that is, the individual's wants, emotions, and cognitions operate in concert to influence his actions."
>
> (page 4)

They go on to argue -

> "Man acts upon his ideas. His irrational acts no less than his rational acts are guided by what he thinks, what he believes, what he anticipates. However bizarre the behaviour of men, tribes, or nations may appear to an outsider, to the men, to the tribes, to the nations their behaviour makes sense in terms of their own world view. Every man, through 'cognitive work', attempts to construct for himself his own meaningful world, and he classifies and orders within a multitude of objects, amongst which the most significant are other people. As Sir Frederick Bartlett has suggested 'it is fitting to speak of every human cognitive reaction - perceiving, imagining, and reasoning - as an effort after meaning."
> (Kresh, Crutchfield and Ballachey, 1962: 17)

There are many situations today in which the rationality of human behaviour is not immediately evident. Several parts of the

world, for example, are located in a particular position which makes them vulnerable to some natural hazard. There are four such locations which highlight this problem. Rabaul in Papua Niugini is located on the edge of an active volcano. New Zealand's capital city, Wellington, located in the Main Seismic Region, is astride an active fault. When (not if) an earth tremor with the appropriate 'specifications' occurs, catastrophic losses will follow. In California, the San Andreas Fault will create similar havoc for millions of residents. Even within Australia, the devastating bushfires which have ravaged South Australia, Victoria and Tasmania in recent months are likely to recur with equally devastating effect (see Britton, 1982a; in press). Many other examples from other parts of the world could be used to illustrate similar vignettes, but these four, taken from four different countries, highlight the difficulties facing not only planners and governments, but also communities themselves.

A simple model of Insuring Man would argue that the probability of a person insuring against a natural disaster would be a function of the size of the damage by the frequency of its occurrence. There could be several strategies which would be open to him, but essentially all depend on these two factors. However, it is necessary to produce a much more complex model to explain insuring behaviour.

It has not been possible to offer a definition of Insuring Man in this paper, but we have been able to identify a number of characteristics, by extracting variables from the literature related to natural disaster insurance, which we think offers some indicators toward identifying such an Insuring Man. In order to develop an overall understanding of such a concept the factors which will be identified in this paper are no more than at attempt to initiate the development of a model commensurate with real world experiences.

This paper attempts to provide a framework from which further research can be undertaken in the development of a model capable of explaining the decision processes an individual employs in his decision to purchase natural disaster insurance. We sought to address the question 'what is known about the factors which influence a person's decision to purchase natural disaster insurance?'. Because this is a preliminary exploration, both for us, and, it appears for others as well because we were unable to find any published sources that provided a review of the literature on this topic, we decided that an appropriate place to start was to survey all the material we had available to us in our personal libraries at the Centre for Disaster Studies. There have been other attempts at codifying research undertaken by researchers in the natural hazards field. Perhaps the most obvious and most well-known of these codifications is the sociological study undertaken by Mileti, Drabek, and Haas in 1975. However, Mileti and his co-authors did not set out to review the literature relating specifically to the topic of insurance and natural disaster. They did, however, produce an extremely useful document, which has been as invaluable to us in our exercise as it no doubt has been for many others pursuing other areas within natural hazards research. Our effort here, then, has been an attempt to summarize what others have found about this very important and somewhat neglected area. Our aim was also to offer a guide to others who may be interested in developing the question we posed into a more comprehensive review.

We did not set out to contextualize our findings within any theoretical framework. There are a number of such orientations which would have been appropriate for the development of academic pursuits, but it was thought we could best provide our results to a wider audience if we 'limited' our efforts to finding out directly just what others had found in their studies. In order to find the answer to our question we had to go outside the primary area of enquiry and look at specific research topics that would appear to be only peripheral to our endeavour. The peripheral areas which we entered into, admittedly not very thoroughly, were those research topics concerned with contextualizing our immediate task. Thus,

we referred to articles on risk-taking and general insurance, as well as some of the more mainstream papers dealing with natural hazard awareness. As has been mentioned earlier, these articles have been mainly undertaken by geographers, and by sociologists, who were primarily focussing their enquiries into people living in floodplain, and earthquake-prone locations.

From the literature we reviewed, 32 variables were deployed as titles to collate over 160 abstracts which we considered were relevant for the task we had set ourselves. These variables were either taken straight from the existing literature or were renamed by us through amalgamating specific topics that showed some similarity in intention or output. The 32 variables were then re-grouped into five broader categories. This was done to provide order to the information which we found; it also enabled us to present the material more easily. The five categories which were found in the survey of the literature concerned with insurance and natural disaster purchase decision processes were salience, information, awareness, experience, and insurance factors.

2 Salience

Salience refers to those features of hazard events which are of relevance to an individual and which are likely to have some effect on his future behaviour. They are components which are psychologically relevant to an individual. It has been described by English and English (1958) as -

> "the degree to which an experience stands out sharply and is relatively disconnected from the rest of the experience"
>
> (page 471)

and by Chaplin (1968) as -

> "the relative prominence or distinctiveness of some parts of the cognitive fields over others.
>
> (page 436)

The following variables have been found to contribute to the salience of natural disasters. They affect the individual perception and therefore the objective knowledge of an individual.

The literature review suggested that six variables were important in the provision of salience factors related to the objective knowledge of natural hazards (refer Figure 1).

2.1 Frequency of Events

Has been found by a number of researchers to be of significance. For example, Saarinen has suggested that -

> "Although research has clearly established that people can and do learn from hazard experience, the rarity of major hazard events in any one place makes it unlikely that most will ever gain a true appreciation of their potential magnitude."
>
> (Saarinen, 1982: 27)

Similarly, Kates has stated that -

> "Hazards characterized by high frequency of impact are associated with the utilisation of more adjustments."
>
> (1971, in Mileti et al, 1975: 27)

Kunreuther has also supported this variable's prominence by stating -

> "Basically, it is not the magnitude of a potential loss that inspires people to buy insurance voluntarily - it is the frequency with which a loss (no matter what the size) is likely to occur."
>
> (Kunreuther, 1978: 29)

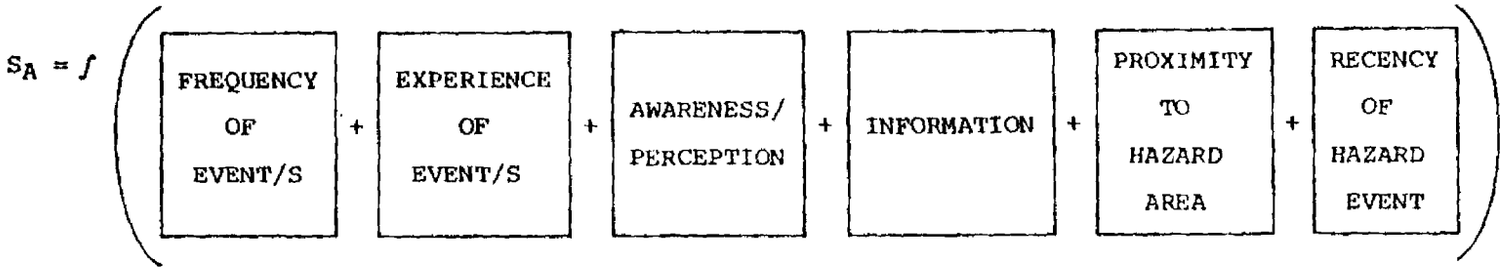

Figure 1. Objective knowledge of natural hazard problem (salience) (S_A)

In the case of floods -

> "Accuracy of hazard assessment increases with greater flood frequency, longer experience in the area, and knowledge of past flooding."
> (Burton, 1962; Kates 1962; in Mileti et al, 1975)

also -

> "A review of insurance records indicated that sales of crop-hail insurance tend to rise after periods of heavy-loss years and fall after periods of light-loss years. These cycles of hail occurrence may influence not only adoption patterns but also the perception of the hail threat and the perceived possibility of sustaining a hail loss."
> (Rydant, 1979: 316)

2.2 Experience of Events

After interviewing flood plain residents, Kates (1962) concluded that -

> "Individuals must experience floods relatively often and suffer severe losses from them to want to invest in protective activities."
> (Kunreuther, 1976: 244)

Kunreuther supports Kates' finding when he states -

> "Past experience may be necessary to raise the probability to a level where a person feels that it is a problem worthy of attention."
> (Kunreuther, 1983: 14)

Mileti and his co-authors also collated material on the variable -

> "Persons having more previous experience with the specific hazard ... tend to have greater accuracy of hazard perception."
>
> (Mileti et al, 1975: 24)

This may be due to the possibility that -

> "Past experience may render current warnings less credible if disaster is not part of experience, or more credible if disaster is part of experience."
>
> (Mileti et al, 1975: 47)

> "Most citizens express a belief that the worst events of the past will not be repeated."
>
> (White, 1945)

Kates is more explicit when referring to the part experience plays -

> "Only in the 'high certainty' situation does experience act as a teacher."

However, McLuckie has pointed out that prior disaster experience may provide reference points that give a false sense of security and thus lessen the sense of urgency and adequacy of response of the social system. He states that this type of experience may engender a sort of 'false-alarm subculture' in which -

> "warning messages elicit a standard interpretation, in this case a negative one ... Prior disaster experience involving either

> direct impact or consistent 'misses' may simply produce a different basis for evaluation."
>
> (1970: 37)

In contrast, Bauman suggests that people may also over-react to their previous experience -

> "Such little faith in Canyon Dam is certainly expectable since the 1972 flood brought several million dollars of damage to the community."
>
> (Bauman, 1976: 17)

Combining flood hazard experience with other variables, Bauman and Sims suggest that -

> "The insured homeowner is he who has suffered damage from a flood, who enjoys a relatively higher social class position, and who is internally-oriented, that is, he feels that the effects of the future on him are determined by his own current behaviours."
>
> (Bauman and Sim, 1978: 195)

Of course, it is not only past experience which affects an individual's interpretation of events. Adams (1965), for example, has pointed out that because most people want to think of themselves as being safe, any ambiguity in their environment will be interpreted as evidence for the best. Alternatively, Hudson (1954) has suggested that anxiety-high persons will perceive events in the environment as confirming their answer (see Sims and Bauman, 1972).

2.3 Awareness/Perception

With a shift in interest toward non-technical solutions to hazard problems, a concomitant feature of natural hazard research has been the realisation of the importance of understanding the attitudes, perception, opinions and motives of persons who are living on or near hazard-prone locations.

> "Awareness and perception of the hazard appear to be the chief reasons why many residents do not intend to purchase flood insurance. Over half (54.4%) (n = 56) said there is no danger, so why should they buy insurance while another 15 (respondents) said that it (meaning the buying of insurance) was too expensive."
>
> (McPherson and Saarinen, 1977: 37)

In an article reviewing the literature on risk assessment, Slovic et al came to three conclusions bearing on the issue of education for behaviour change. Their conclusions are relevant for us -

> "A basic one is that people are resistant to change. Once initial impressions are formed they tend to structure and distort the interpretation of new evidence. Another is that making decisions about risky activities is difficult and humans may not be intellectually equipped to respond to that difficulty constructively. Instead, life's gambles are oversimplified to allow easy solution avoiding cognitive strain and emotional anxiety. A thid conclusion is that otherwise intelligent individuals do not always have accurate perceptions of the risks to which they are exposed. Hazards that are easy to

> imagine or recall, that are certain to produce death, that take multiple lives, and have particularly dreaded consequences are overestimated, while risks from common, undramatic events involving only one person at a time are underestimated."
> (Slovic et al, 1977; in Saarinen, 1982: 16)

Studies on the flood hazard have suggested the following -

> "Most persons living in flood-prone areas are aware of that fact. But such awareness does not inevitably or even preponderately lead to rational adaptive measures such as insurance."
>
> (Kates, 1971)

> "The more certain future flooding is the more likely the residents are likely to perceive floods as natural repetitive events and to hold a firm belief that that area will suffer future flooding."
>
> (Kates, 1962)

> "Contrary to what one might expect, those homeowners who perceived the Canyon Dam (U.S.A.) as protection against floods were more likely to purchase flood insurance than were those who felt that the dam would not protect them. When this is juxtaposed in Kunreuther's finding (Kunreuther et al. 1977) that flood area homeowners who take personal protective actions to improve their property's ability to withstand a future flood are at the same time significantly more likely to have flood insurance, a case begins to be built for positing what might be

called a 'coping character type'."
(Bauman and Sims, 1978: 195)

"Recent data indicate that residents of flood-plains assume that flooding will not recur during the next decade or two."
(White et al, 1958)

The outcome of Kunreuther and his colleagues' studies of bo flood- and earthquake-prone areas indicated that -

"There was a 55 per cent difference in the probability of having insurance between those who knew someone with insurance coverage and thought the flood or earthquake hazard was a serious problem and those who neither knew an insurance purchaser nor considered the problem important."
(Kunreuther et al, 1978: 736; in Saarinen, 1982: 19)

Studies which have focussed on earthquakes elsewhere than the United States have suggested that -

"Awareness, even when acknowledged, is not in itself a sufficient stimulus for the taking of action. Even the personal experience of a devastating earthquake does not imply that the individual has any greater accuracy perception of the earthquake than anyone else."
(Britton, 1982b: 308)

"Less than half of a surveyed population (in Napier, New Zealand) considered that the Napier region would again experience an earthquake similar to that of 1931 (in which 256 perished) ... Following the

> 1968 earthquake in Inangahua (New Zealand), residents were adamant that they would not experience any more destructive earthquakes because they had already received their 'big one'."
>
> (Britton, 1981: 387)

With respect to awareness and adoption, studies have looked at both individual and community considerations. At the individual level -

> "The picture emerging from these earlier studies is one of a person reluctant to take any protective action unless he had passed through a sequence of steps which alert him to the dangers of the hazard and the availability of insurance."
>
> (Kunreuther, 1976: 244)

Related to this, although the suggestion is not universally regarded, is Bauman and Sims' statement that -

> "Ignorance of a hazard in hazard-prone areas is rare."
>
> (Bauman and Sims, 1978: 189)

On a community level, Bauman suggests that knowledge of a successful adoption of hazard management techniques by another community could be an important prerequisite for adoption elsewhere -

> "An important element in the acceptance of innovations may be the knowledge that other places have successfully adopted the innovation. When the leaders were asked if other communities in the area were using flood-plain management techniques in order to reduce losses from

> flooding, 50 per cent of the supporters knew of cities or counties that had passed such regulations, while 33 per cent of the opposers had no knowledge of the acceptance of regulations by area communities. The remainder of the opposers, 67 per cent, did not know. Forty per cent of the supporters thought that no other communities had adopted such regulations and 10 per cent responded they did not know."
>
> (Bauman, 1976: 17-18)

2.4 Information

Information of the hazard plays an important role within the individual, although a number of studies have highlighted the problematical nature of incorporating relevant and objective information into the person's consciousness -

> "One of the most signficant preliminary findings to emerge from our analysis of the survey data is the limited information individuals have on both the hazard itself and the insurance option."
>
> (Kunreuther, 1976: 233)

> "... people do not act upon information concerning impending natural disasters."
>
> (Reser, 1980: 31)

> "Individuals are reluctant to collect and process information or possible adjustments to natural hazards because they have more pressing things on their minds."
>
> (Saarinen, 1982: 18)

2.5 Proximity to the Hazard Area

Proximity is another variable highlighted within the literature reviewed. Diggory (1956) found that -

> "The greater the proximity to the threatened the smaller the tendency to overestimate the magnitude of the threat."
>
> (In Mileti et al, 1975: 47)

Proximity, however, was not found to be a salient feature if considered in isolation. Thus, despite the fact that -

> "The sample was intentionally designed to cover only communities where flood or earthquake insurance can be purchased. However, only 69 per cent of the respondents in the flood survey and 62 per cent of those interviewed in earthquake susceptible areas of California are aware that insurance is available in their neighbourhoods."
>
> (Kunreuther, 1976: 233)

> "Could it be then, that the adoption of floodplain insurance has remained relatively low because flood-prone residents have an unwarranted faith in the existing engineering structures?"
>
> (Bauman and Sims, 1978: 198-3)

> "In sum, the survey results indicate that neither the home buyers within nor those near the special studies zones attached much importance to earthquake hazards in their decision to buy a house (in California)."
>
> (Palm, 1981: 65)

2.6 Recency

Similarly, recency of a hazard event is also considered to be a salient feature, as illustrated in the following supporting statement -

> "It has also been shown that persons who have had recent disaster experience have a higher probability of taking protective actions on the basis of warnings than persons without such experience."
>
> (Mileti et al, 1975: 50)

> "Experiencing recent and intense impact by the hazard also seems to be associated with more accurate hazard perception."
>
> (Mileti et al, 1975: 24)

> "It has been documented over and over that planning to overcome the worst effects of natural hazards is most intense immediately after an extreme hazard event."
>
> (Saarinen, 1982: 1)

3 Information

Information is knowledge on which we modify, initiate or cease action. It is 'a set of facts or ideas gained through investigation, experience or practice' (Chaplin, 1968). It is 'only a quantity. It does not specify content, usefulness, value, truthfulness, factual status, history or purpose' (English and English, 1958). 'Information is involved in human interactions where the attitudes, needs, desires, moods, feelings, interests, perceptions, thoughts, etc., of other people and of ourselves are involved' (Wolman, 1973).

The following studies addressed the relevance of information to insurance and the perception of threat.

We divided the extracts which contained statements relating to information into four subdivisions. These subdivisions are illustrated in Figure 2 below. In addition to these subdivisions the data already outlined in the discussion on salience is important to the present focus.

3.1 Lack of Knowledge of Hazard Characterists

According to Mileti *et al* most persons -

> "Simply do not know the character and extent of the hazard(s) for the area in which they reside or work."
>
> (Mileti *et al* 1975: 31)

This viewpoint, however, is mediated by comment from other observers -

> "People do learn from experience but they tend to believe they have a better picture of the truth than they really do - especially in dealing with rare events."
>
> (Saarinen, 1982: 3-4)

> "The greater the proximity to the threatened area, the smaller the tendency to overestimate the magnitude of the threat."
>
> (Diggory, 1956)

> "For persons who may learn of the hazard(s) after residing for a time in an area, the pull factors of accustomed surroundings seem to outweigh any fear-based push factors."
>
> (Roder, 1961; in Mileti *et al*, 1975: 31)

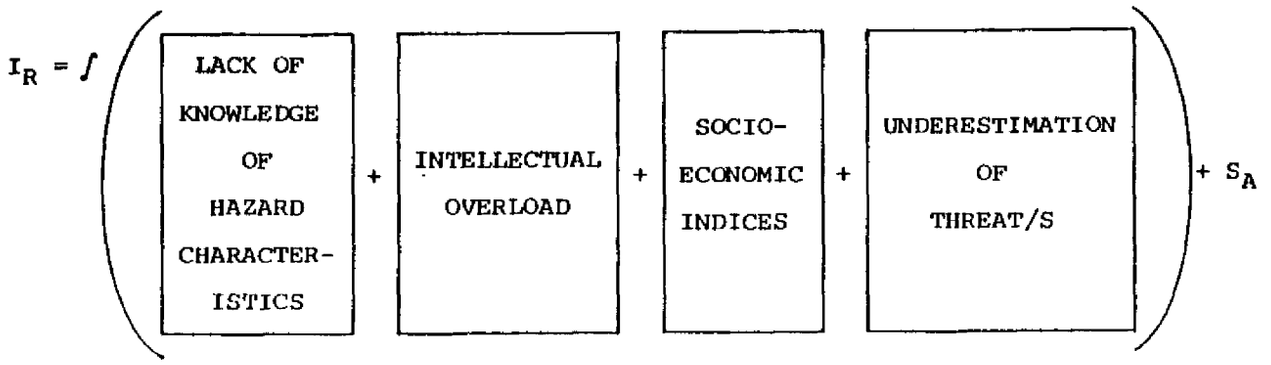

Figure 2. Relevant information (I_R)

> "When there is variation in the amount of knowledge, it is often unrelated not only to type of adjustment but, indeed, even to whether or not any adjustment is made."
>
> (Bauman and Sims, 1978: 189)

Some explanations have been advanced to help understand the attitudes that some people, living in disaster-prone regions, have towards natural hazards. The discrepancy between attitudes and action (for the mitigation of the hazard threat) is in large part due to the interpretation that individuals place on the information they receive from the physical environment after it has been mediated by subjective considerations, both conscious and unconscious.

> "... there are several systematic mechanisms for dispelling uncertainty. The most common of these was to view (floods) as repetitive, and even cyclical, phenomena. In this way the randomness that characterizes the occurrence of the hazard is replaced by a determinate order in which history is seen as repeating itself at regular intervals. (Burton and Kates, 1964) Another common view was the 'law of averages' approach, in which the occurrence of a severe flood in one year made it unlikely to recur the following year. Other occupants reduced uncertainty by means of various forms of denial. Some thought that new (structural) protective devices made them 100 per cent safe. Others attributed previous floods to a freak combination of circumstances unlikely to recur. Still others denied that past events were floods, viewing them instead as 'high water'. Another mechanism was to deny the determinability of natural phenomena.

> For these people all was in the hands of a higher power (God or the government). Thus they did not need to trouble themselves with the trouble of dealing with the uncertainty."
> (Slovic, Kunreuther and White; in White, 1974: 190)

This aspect will be pursued in more detail later in this paper.

3.2 Intellectual Overload

One feature which has not received much consideration in the general literature concerning decision-making within the natural hazard/disaster setting is that proposed by Slovic and his colleagues regarding the possibility that man may not be intellectually equipped to fully comprehend decisions in an area that is characterised by uncertainty.

> "Making decisions about risky activities is difficult, and we may not be intellectually equipped to respond to that difficulty constructively. Often it seems that, in the interests of reducing cognitive strain and emotional anxiety, life's gambles are oversimplified to allow easy, if suboptimal, resolution."
> (Slovic, Fischoff and Lichtenstein; in Kates, 1977: 88)

> "We can hypothesise that his limitations with respect to processing information may force man to simplify the decision-making process. According to this view, the individual will not collect data unless motivated to do so. Hence he may not take any positive action because of his

> limited knowledge ... Recent empirical studies by social scientists indicate that man has a difficult time making decisions and hence may behave in a manner unlike the rational economic man."
>
> (Kunreuther, 1976: 242)

Palm has suggested that if certain considerations are kept in mind when information is disseminated to members of the general public, some of the difficulties which may be caused by difficulties in comprehending irregular natural vagaries may be overcome.

> "A survey of literature linking information programmes with the adoption of mitigation measures concludes that nine conditions must exist:
>
> 1 the information should be made personal to the adopter;
> 2 information on risks associated with the hazards and costs and benefits of mitigation should be as specific as possible;
> 3 information should be clear and unambiguous;
> 4 information should prescribe precise appropriate measures to cope with the hazard;
> 5 information should originate from a credible source;
> 6 local social reinforcement of the information should be present;
> 7 several different media should be used for information dissemination;
> 8 fear appeal or positive action appeal should be used appropriately based on an understanding of the intended audience; and

9 previous attitudes, values and beliefs of the audience should be considered when designing the message."

(Palm 1981: 20)

3.3 Socio-economic Indices

"There are a number of factors which the findings suggest are not related to accuracy of hazard perception: education, sex; income, and age."

(Mileti et al, 1975: 24)

"Women are more likely to interpret signals as valid than men."

(Mack and Baker, 1961)

"Small town residents or urban dwellers with small town backgrounds are less likely to interpret a warning as valid than are urbanites."

(Mack and Baker, 1961)

"Professionals, and then businessmen were more knowledgeable than citizens in general."

(Roder, 1961; in Mileti et al, 1975: 31)

"The older the individual the less likely he is to interpret the warning as real."

(Friedsam, 1961: 2)

"There appears to be a tendency for persons of low and high education to disregard the formal meaning of a signal, while persons of middle socio-economic status are more likely to accept the formal meaning."

(Mack and Baker, 1961; in Mileti et al, 1975: 47)

3.4 Underestimation of Threats

> "The general tendency would seem to be to underestimate the threat of the hazard."
>
> (Saarinen, 1982: 4)