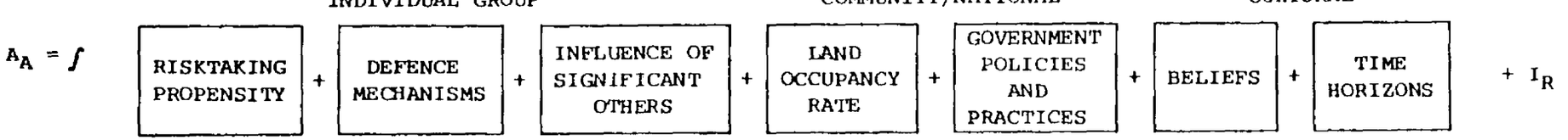
4 Awareness

Being aware or alert refers to an action process of paying attention to something. Chaplin (1968) defines awareness as 'consciousness, alertness, cognizance of something; a state of knowledge or understanding of environmental or internal events'. English and English (1958) describe it as 'being conscious of something; the act of 'taking account' of an object or state of affairs. The term implies neither attention nor an assessment of the qualities or the nature of the object'.

Awareness was mentioned in many studies and can be categorised with the following sub-headings: risk-taking propensity; defence mechanisms; influence of significant others; land occupancy rate, government policies and practices, beliefs, and time horizons (see Figure 3).

4.1 Risk-taking Propensity

> "Risk-taking propensity is not substantially related to hazard perception. With respect to floods, having knowledge regarding protective structures seems to connote greater accuracy but was found to be unrelated to overall accuracy of hazard perception."
> (Mileti et al, 1975: 25-6, commenting on Kates, 1971)



INCLUDING

1 Law of average attitudes
2 Outright denial
3 Psychological distancing & psychological reality
4 Risk-aversion
5 Fatalism
6 Ordering of events
7 Availability
8 Locus of control
9 Anchoring and adjustment
10 Coping/noncoping character type
11 Probability threshold

INCLUDING

1 Regret
2 Groupthink
3 Risky shift
4 Group pressure

Figure 3. Accuracy of awareness of the natural hazard (A_A)

One explanation for the apparent risk which people appear prepared to accept is that of the 'gambler's fallacy' -

> "The gambler's fallacy seems to affect those individuals who have personally experienced severe losses from a low-probability event. Rather than increasing insurance coverage, these individuals decrease their insurance purchases on the assumption that the event will not be repeated over the short run."
>
> (Palm, 1981: 12)

At least one researcher has suggested that a connection between intellect and risk-taking propensity may exist -

> "... there is some relationship between good (school) grades and the willingness to take risk."
>
> (Greene, 1963: 169)

4.2 Defence Mechanisms

There appears to be a well-established fact that man's confrontation with his physical environment is influenced not only by the facts of that environment but also his ideas and feelings about it. These, in turn, are influenced by his personality and culture (see Sims and Bauman, 1972: 1388). We have taken eleven psychological defence mechanisms that appear to have congruence in the literature. The first, the gambler's fallacy, has been introduced above -

4.2.1 The gambler's fallacy or the law of negative recency

> "Clear-cut information about the probability of an event is not taken

> into account because people believe that chance is a self-correcting process, such that a deviation in one direction will necessarily be followed by a deviation in the opposite direction (for example, 'It rained more than the average the past few months and therefore it will rain less than the average next month - so let's decide to take our vacation then."
> (Janis and Mann, 1977: 16) (See also Jackson and Burton, 1978: 250-1)

4.2.2 Outright denial

> "Some of the most common ways in which people appear to distort reality and express ideas about uncertainty include outright denial that earthquakes will occur again in the same place."
> (Jackson and Burton, 1978: 250-251)

4.2.3 Psychological distancing (psychological reality)

> "... emotional defences are in all probability employed to minimize anxiety and fear. This would be reflected in a psychological 'distancing' of the event, rationalizations with respect to marginal personal consequence probabilities, and simple denial."
> (Reser, 1980: 37)

4.2.4 Risk-aversion

> "Under conditions of uncertainty it is assumed that most behaviour is 'risk-averse'. That is, individuals prefer a certainty to a gamble which would result in either a large loss or a large gain. This model predicts that a prospective home buyer would be risk-averse, and therefore attempt either to avoid the risk by not purchasing the property, or to lessen its impact by purchasing insurance ... there is mounting evidence that decision-making is not perfectly accounted for by such models ... Experimental findings which run counter to the model are that:
>
> 1 many people do not have correct information about many of the factors relevant to the expected utility model, such as information concerning fixed losses (premiums) and pay-offs (deductible levels, levels of subsidization) (Kunreuther et al, 1978a);
> 2 even with correct information many insurance decisions are inconsistent with those which would be predicted from theory (Kunreuther et al, 1978b; Slovic et al, 1977); and
> 3 there exists a general unwillingness by consumers to insure against low-probability high-loss events (such as earthquakes) (Slovic et al, 1977)."
>
> (Palm, 1981: 11)

4.2.5 Fatalism

> "... it may be that environmental hazards ... are part of the accepted difficulties of life for some urban subpopulations."
> (Van Arsdol, Sabagh and Alexander, 1964: 153)

> "Disaster is due to fate or chance or powers that be."
> (Mileti *et al*, 1975)

> "When asked to assess why the real estate agents felt the home buyers were not concerned with special studies zones locations, (relating to earthquake-prone areas in California), agents answered that they believe that buyers are generally fatalistic about 'acts of God' beyond their control, and tend to accept the notion that all California is earthquake country, and that to live in the state means to accept a certain risk of damage from earthquakes."
> (Palm, 1981: 80)

4.2.6 Ordering of events

> "There is a tendency ... for coastal regions to perceive extremely severe storms as being repetitive in nature."
> (Burton *et al*, 1965)

> "... erroneous notions of the event series as cyclic."
> (Jackson and Burton, 1978: 251)

4.2.7 Availability

> "People estimate probability and frequency by a number of heuristics or mental strategies which allow them to reduce these difficult tasks to simpler judgements. One such heuristic is availability, according to which one judges the probability of an event ... by the ease with which relevant instances are imagined or by the number of such instances that are readily retrieved from memory ... the notion of availability is potentially one of the most important ideas for helping us understand the distortion likely to occur in our perceptions of natural hazards."
>
> (Tversky and Kahneman, 1979: 1127)

4.2.8 Locus of control

(Internal and external locus of control.)

> "Important factors in attitudes toward future dangers are estimates of whether anything can be done about them, and whether the individual believes himself to be in a position to do anything."
> (Rotter, 1966, in Bauman and Sims, 1978: 190, also Simpson-Housley, 1979)

4.2.9 Anchoring and adjustment

> "Another heuristic which seems useful in describing how humans ease the strain of integrating information is a process called anchoring and adjustment. In this process a natural starting point is used as a first approximation to the judgement, an anchor, so to speak. This anchor is then adjusted to accommodate the implications of the additional information. Typically, the adjustment is a crude and imprecise one which fails to do justice to the importance of additional information."
>
> (Tversky and Kahneman, 1974: 1128)

4.2.10 Coping and noncoping character

> "It would appear that there are psychodynamically copers and noncopers. The former are persons who tend to take advantage of whatever means are available to mitigate the impact of a possible hazard. The latter, on the other hand, tend either to ignore or to resist protective measures. The copers, therefore, may need but little persuasion to buy insurance; the noncopers may be immune to all but 'coercion'."
>
> (Bauman and Sims, 1978: 196)

4.2.11 Probability threshold

> "(One) explanation for the empirical observation of non-risk-averse behaviour is the existence of a probability threshold (Kunreuther et al, 1978b): probabilities below some minimum threshold seem to be treated as if they were zero (Slovic et al, 1977)."
>
> (Palm, 1981: 13)

> "People refused to attend or to worry about events whose probability is below some threshold, the level of which may vary from individual to individual and from situation to situation."
>
> (Kunreuther et al, 1978b: 236)

4.3 Influence of Significant Others

Similar to the individual defence mechanisms described above, researchers have also proposed a number of concepts to explain the discrepancy between a person's actions to the physical environment and the activities of the physical environment. We begin with the notion that -

> "Adoption of a hazard adjustment is often, but not always, an individual matter."
>
> (Mileti et al, 1975: 26)

In support of this, four conceptualisations will be discussed. They are -

4.3.1 Regret

> "Tversky and Kahneman have speculated that such personal interaction also opens one up to regret. For example, if most people in your circumstances purchase insurance and you do not, then you would be open to severe regret if loss occurs. However, if almost all others are uninsured, a loss will probably not cause you to regret being uninsured. It is not only the loss per se that determines regret, but the loss in conjunction with social norms or accepted rules of conduct."
>
> (Kunreuther, 1976: 246)

4.3.2 Groupthink

> "Groupthink is a 'collective pattern of derisive avoidance' (Janis, 1972). It has been observed amongst members of highly cohesive groups. It is a concurrence-seeking tendency which members use to support shared illusions about the invulnerability of their organization or nation."
>
> (See Janis and Mann, 1977: 129-131)

4.3.3 Risky shift

> "There is considerable evidence that after participation in group discussion in which they must choose

> between a set of hazardous alternatives, individual members tend to be even riskier in their decision making than they had been when left to their own choices (Kogan and Wallach, 1967). Kogan and Wallach believe that the risky shift occurs because of the diffusion of responsibility that takes place when a decision is made by a group. They believe that when one individual has complete responsibility for a choice he is afraid to risk bad consequences, whereas when several persons share the responsibility,blame for errors in judgement is not hung solely upon any individual. In brief, the individual feels he can afford to take chances because the decision is no longer his alone and his responsibility is correspondingly reduced."
>
> (Mann, 1973: 148)

4.3.4 Group pressure

With reference to groups of people, Bauman has stated that -

> "If the community is convinced of the need and effectiveness of the regulations (for floodplain management) and participates in their formulation, voluntary compliance may be promoted."
>
> (Bauman, 1976: 28)

There are additional observations which identify the sig-

nificance of other persons within an individual's decision-making processes that pertain to perception and the acquisition of natural disaster insurance. Some of these are -

> "Whether or not a person has a favourable attitude toward a given type of insurance (e.g. health insurance) does not seem to affect the likelihood of his purchasing that particular type of insurance. Thus an individual might be kindly disposed toward a certain coverage but yet does not buy it for himself. Presumably he might recommend it to others. Yet there is some tendency for those who have favourable insurance attitudes to be among those who are the heavier buyers of insurance."
>
> (Greene, 1964: 37)

> "Kunreuther et al (1978b) found that the two most important factors in predicting whether a person will purchase insurance were whether the hazard was considered to be a serious problem, and whether the person knew someone who purchased insurance. The first seems to be related to hazard experience. The second highlights the importance of personal influence of friends or neighbours in the adoption process. The cost of the search for information is important and friends and neighbours are seen as convenient and reliable sources."
>
> (Saarinen, 1982: 19)

> "A large-scale disaster in one locale stimulates for a time the serious consideration of adoption of relevant adjustments in nearby similar hazard locales."
>
> (Mileti et al, 1975: 28)

4.4 Land Occupancy Rate

Another variable which influences the individual's ability to acquire an awareness of his natural environment is tenureship within the location.

> "Most persons simply do not know the character and extent of the hazard(s) for the area in which they reside or work. One reason for that would seem to be that long-term occupance of high hazard areas is never really stable; in, out, and return migration persists."
>
> (Mileti et al, 1975: 31)

4.5 Government Policies and Practices

A number of statements discuss the role of government actions. Some of them are -

> "Responsibility for solving the flood problem seems for most residents to lie with some level of government. City, state and county governments were mentioned almost equally as the responsible agencies while federal government was referred to much less often."
>
> (McPherson and Saarinen, 1977: 37)

> "The movement towards the narrowing of democratic participation in decision-making ... may have implications for earthquake hazard programs."
>
> (Britton, 1981: 388)

> "New Zealanders are under the false assumption that any damage to the property caused by earthquakes will be compensated by the government through the government-backed Earthquake and War Damages Commission."
>
> (Britton, 1982b: 302)

Kunreuther and Slovic offer contradictory evidence to earlier research when considering the effect of government intervention -

> "One of the most surprising results (of a study conducted in 40 cities throughout the United States) was the large number of uninsured homeowners who expected no federal aid at all in the aftermath of a major disaster. This indicated that neglect of insurance could not be attributed to expectation of generous government relief."
>
> (Kunreuther and Slovic, 1978: 66)

Earlier studies on this topic had noted -

> "... that, whereas few individuals insure themselves voluntarily against the consequences of natural disasters, many turn to the federal government for aid after suffering losses. As a result, the taxpayer is burdened with financing the recovery for those who could have provided for themselves by purchasing insurance."
>
> (Kunreuther and Slovic, 1978: 66)

also -

> "The most disturbing aspect of federal relief is that it does nothing to discourage individuals from moving into disaster-prone regions (e.g. floodplains) thus perpetuating the need for more loans and grants in the future."
>
> (Dacy and Kunreuther, 1969)

> "The volume of assistance from the federal government has varied greatly but the pattern of response appears to be that the federal government responds most favourably to those situations least covered by insurance."
>
> (Dacy and Kunreuther, 1969)

4.6 Beliefs: a Part of the Cultural Milieu

Apart from the technological orientation, there is another belief which has a hold over certain populations, as explained by Mileti et al -

> "There are three different classes of explanation for a disaster event:
> 1 'naturalistic' - the cause is a result of natural law (scientific laws);
> 2 'fatalistic' - disasters due to fate or chance, or powers that be (random occurrence); and
> 3 'supernaturalistic' - some supernatural power is responsible for the event ...
> When catastrophe is thought to be engendered primarily by spiritual forces, man can himself do little to alter the course of events apart from recourse to religious

> and/or magical practices. In societies where such beliefs prevail, magical practices may be the only actions taken before impact."

> "Possibly, their desire not to become involved reflects a more general cultural policy on non-involvement in issues."
> (McPherson and Saarinen, 1977: 38)

> "... 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 problem of dealing with the uncertainty."
> (Slovic, Kunreuther and White; in White, 1974: 190)

Some studies have also suggested that there are culturally prescribed differences in the way people regard disasters -

> "Anglo and Latins could not define the situation the same, and so acted in non-complimentary roles. Anglos defined an emergency, Latins did not."
> (Stoddart, 1961; in Mileti et al, 1975: 109)

4.7 Time Horizons

Another cultural condition which plays a part in the awareness of natural hazards lies within the time-frame which persons learn to view aspects of their lives. A study by Boniecki (1980) questioned the tendency to take for granted the individuals' interest in emotional involvement in the horizon of his own lifetime, as well as that of his children

and his grandchildren. The major conclusions from the study (conducted in Australia) are -

> "... concerns about future social problems, which presumably could include natural hazards, must be presented in terms of the individual time horizon. A time horizon of 20 years appears too distant for many people to evoke a meaningful concern leading to concrete behavioural commitments. The most distant practical horizon is seen as 10-15 years and planning for even shorter time horizons should increase chances of public approval."
>
> (Saarinen, 1982: 18)

5 Experience

Experience is the internalising of events. It refers to -

> "1 The living through and personal encountering of an event;
> 2 skill or understanding which is the result of living through something, or of practice, or of participation in something;
> 3 the whole of mental phenomena or of consciousness at any particular moment."
>
> (Wolman, 1973: 133)

> "It is not static; it connotes activity, process, happening, doing,"
>
> (English and English, 1958: 194)

Past experience is of immense relevance to current behaviour. The following variables referred to in Figure 4 below, were found to be relevant in the reviewed studies.

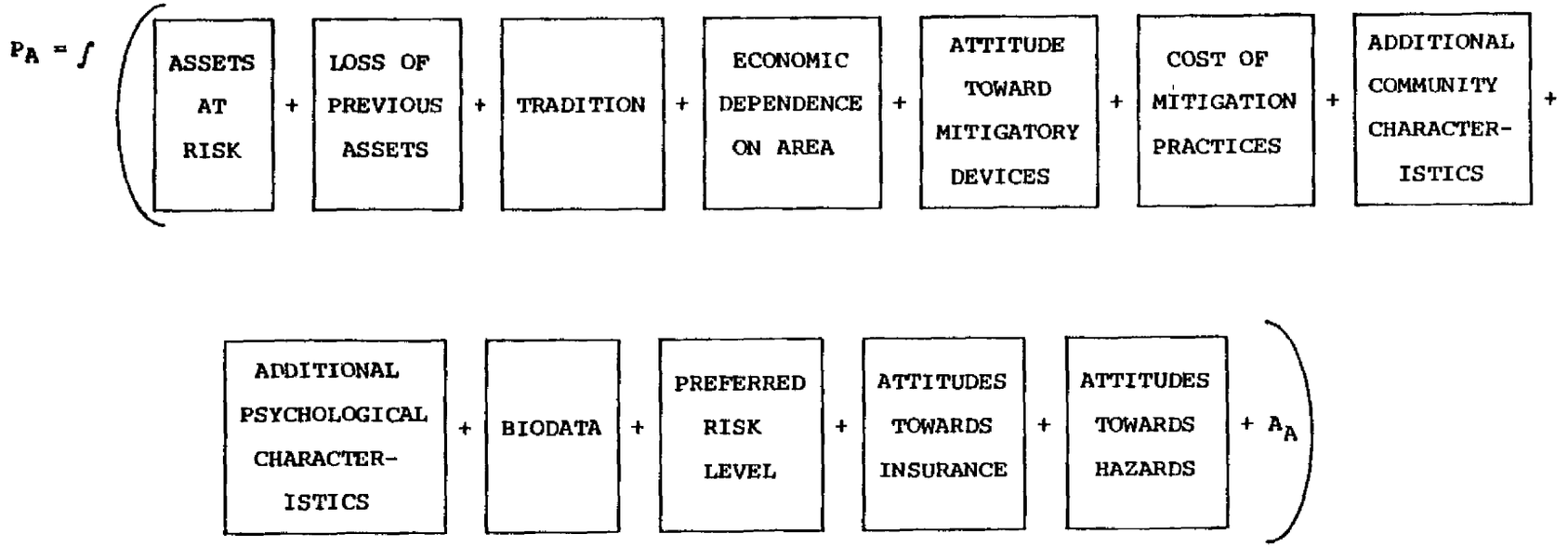


Figure 4. Probability of adopting hazard-mitigation devices (P_A)

5.1 Assets at Risk

Past experience and assets at risk have been suggested by some to be pertinent factors in the adoption process -

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

> "Cycles of hail occurrence may influence ... the perceived possibility of sustaining a hail loss."
>
> (Rydant, 1979: 316)

Writers in the natural hazards/disasters field suggest that property damage and tangible assets are the most likely result from disaster impact - at least in the western world -

> "Disasters primarily damage property rather than people."
>
> (Quarantelli and Dynes, 1972)

Within the United States -

> "Property loss due to natural disasters have increased systematically since 1925 while the loss of life has declined."
>
> (Dacy and Kunreuther, 1969)

5.2 Loss of Previous Assets

A concomitant to assets at risk is the actual experience of losing possessions -

> "It is the frequency with which a loss (no matter what the size) is likely

to occur."

(Kunreuther, 1978: 29)

Some researchers are more explicit in their assessment regarding the importance of past experience involving loss of assets, and its relevance for adopting mitigatory devices -

> "The insured homeowner is he who had suffered damaged from flood ..."
>
> (Bauman and Sims, 1978: 195)

> "After interviewing floodplain residents Kates (1962) concluded that individuals must experience flood hazards relatively often and suffer severe losses for them to want to invest in particular activities."
>
> (Kunreuther, 1976: 244)

> "It may be that economic benefits of locating in a hazard-prone area simply outweigh the losses incurred by the occasional flood; that is, it may be that over the long run insurance costs more than the occasional loss."
>
> (Bauman and Sims, 1978: 192)

5.3 Tradition

The following extract from a study conducted by Jackson and Burton perhaps summarises the role of tradition in the mitigation-adoption forces. They are referring to information concerning natural hazards and their consequences -

> "Information, in terms of scientific reports, legislation and directed literature plays a part in defining the scope

> of adjustments canvassed by governmental agencies. Tradition and precedent, however, are perhaps more important."
>
> (Jackson and Burton, 1978: 252)

5.4 Economic Dependence on Area

Burton (1962) has also provided an explanation for considering other variables -

> "Within a floodplain agriculturalists are more knowledgeable regarding flood hazards than their urban counterparts. The difference appears to be due to their greater dependence on the floodplain for their livelihood."

5.5 Attitude Towards Mitigatory Devices

If one introduces technology into the picture, another perspective takes shape in relation to individual perception of natural hazards. It appears that in general terms, when structural mitigation practices are developed, the populace equates the existence of such development with a lessening of hazard vulnerability. Hence -

> "... some thought that new protective devices made them 100 per cent safe."
> (Slovic, Kunreuther and White, 1978; in White 1974: 190)

> "There is a propensity to attribute to technological devices and especially to flood control structures a 'now it's safe' perspective which at best is only partially correct."
>
> (Mileti et al, 1975: 26)

> "Citizens in floodplains exhibit over-confidence in protective structures and they are highly confident about technological solutions to flood hazards in general."
>
> (White et al, 1958)

There is some evidence which indicates that people do not have an accurate assessment of the process related to certain hazard adjustment development. In New Zealand, for example -

> "Even though payment of premiums to the Earthquake and War Damages Commission is compulsory for all clients with fire insurance, this does not seem to be a well-known fact."
>
> (Britton, 1982b: 309)

Likewise, there is also evidence which suggests that after a hazard experience people are less likely to regard structural mitigation practices with the same degree of confidence suggested by the extracts of Slovic et al (1975) and White et al (1958) above. In Texas, for example -

> "No one felt that the construction of Canyon Dam meant complete safety from flooding for the city."
>
> (Bauman, 1976: 17)

Some people, as suggested by Bauman and Sims in their 'coping character type', regard structural development as complimentary to their own non-structural activities -

> "Contrary to what one might expect, those homeowners who perceived Canyon Dam as protection against floods were more likely to purchase flood insurance than

> were those who felt that the dam would not protect them."
>
> (Bauman and Sims, 1978: 195)

One possible reason why structural devices are favoured to provide safety is that other sources of mitigation are considered to be inadequate. In Palm's study, almost half of her respondents indicated that -

> "there is nothing that either the government or people in the community can do to lessen damage from earthquakes (87 of 207). Of those who did feel that mitigation measures were possible, the most frequent responses were better building codes (18.4%), community education (12.1%), and civil defence-type emergency preparedness (9.7%)."
>
> (Palm, 1981: 58)

However -

> "Clearly the tendency to rely on technological engineering solutions has not led to a lessening of the death and damages toll."
>
> (McPherson and Saarinen, 1977: 26)

One potential explanation for the apparent lack of reduction in damage incurred by natural hazard impact within the United States is suggested below -

> "Natural hazards research and technology development efforts within the federal structure have tended to respond to the 'natural disaster of the moment' rather than to the total mix of potential natural hazard exposure problems."
>
> (Petak and Atkinson, 1982: 380)

> "Kates (1970) observed that it is exceedingly rare for relevant adjustment to be adopted and maintained within organizations and communities insofar as they are designed to cope with highly unusual events such as damaging earthquakes."
>
> (Mileti et al, 1975: 28)

5.6 Cost of Mitigation Practices

> "(Resistance to relatively costly premiums) helps to explain the low adoption levels of flood and hail insurance noted earlier for Boulder, Colorado and Alberta."
>
> (Rydant, 1979: 315)

> "Furthermore, since the house is regarded as a financial investment rather than a permanent residence, avoidance of seismic zones or adoption of costly mitigation measures are not seen as economically rational."
>
> (Saarinen, 1982: 14)

5.7 Additional Community Characteristics

Moore and Cantrell (1976) found that structural differentiation, within a community (which included organisational complexity within the community settings), plus the recency of flood experience were the most crucial factors predicting a local community's participation within the federal flood insurance programme within the United States. They interpreted this finding as support for a general proposition which suggested that structural differentiation within a community 'at the core of a community's capacity to respond to outside demands

and, more generally, to take action regarding community well-being' (1976: 505). This argument is based on the premise that communities with a high level of differentiation, and therefore a large number of specialised organisation, are likely to have organisations specifically related to a given decision area. Successful adoption is also dependent on the ability of municipal governments to integrate all levels of the community into the flood insurance scheme (see Luloff and Wilkinson, 1979).

Other studies, such as Bauman's (1976), suggest that individuals may be influential in community-level adoption processes.

> "If members of the community do not favour a non-structural program for flood control there may be difficulty in implementing and enforcing such a program."
>
> (Bauman, 1976: 28)

5.8 Additional Psychological Characteristics

Bauman and Sims have provided a summary of some of the factors which might possibly be at work in determining whether or not flood insurance is purchased. The factors which they regard as important are -

> "Knowledge of the flood threat, mobilization of psychological defences against anxiety, a sense of personal efficacy in controlling one's own future, attitudes towards the institution of disaster relief, belief in the protection of flood control structures, and cost benefit considerations."
>
> (Bauman and Sims, 1978: 192)

Others have suggested other aspects, for example, McPherson

and Saarinen, in reporting the findings of their research on flood perceptions in Tucson, state -

> "The most significant result is that very few people feel that the individual has any responsibility to do something to protect himself."
>
> (1977: 37)

Saarinen suggests that federal intervention is required because of people's attitudes towards hazards -

> "To minimise losses due to hazards will probably require further federal actions such as floodplain zoning and mandatory insurance since adjustments to hazards are low priorities for individuals and small localities."
>
> (Saarinen, 1982: 21)

5.9 Biodata

When relating the propensity to purchase insurance with specific demographic variables, Greene proposed the following, which may (or may not) be pertinent when the insurance being purchased is directly related to natural disaster coverage.

> "Applied to insurance buying ... young people are less apt to buy insurance against a given risk than older people, a finding often confirmed in practice."
>
> (Greene, 1963: 166)

> "Wallach and Kogan have studied the relationship of age and sex upon willingness to

> take risk... (They found that) the older person generally requires a larger probability of success than a younger person. It was (also) found that attitude change was more abrupt for men than for women."
>
> (Greene, 1963: 166)

5.10 Preferred Risk Level

> "In general a person will take a considerably longer time to make a decision when this decision involves a choice running against his general tendency or his general preferred risk level. In other words, if a person is conservative, a decision involving risk will take him considerably longer than a decision involving relative safety."
>
> (Greene, 1963: 172)

Results from laboratory experiments conducted by Kunreuther and Slovic (1978: 67) -

> "... consistently showed that people preferred to insure against relatively high-probability, low-loss hazards and tended to reject insurance in situations where the probability of loss was low and the potential losses were high. These results suggest that people's natural predispositions run counter to some well-known economic theory (see Milton Friedman and Leonard Savage) which assumes that risk-averse individuals should desire a mechanism to protect them from rare catastrophic losses that they could not bear themselves."

Also -

> "People refuse to attend or to worry about events whose probability is below some threshold, the level of which may vary from individual to individual and from situation to situation."
> (Kunreuther et al, 1976: 236, in Saarinen, 1982: 18)

> "The adoption of insurance, however, is not an all-or-nothing situation, that is, varying degrees of protection which may be purchased."
> (Rydant, 1979: 314)

While Palm infers that the risk-aversion tendency is applicable to most situations -

> "Individuals prefer a certainty to a gamble which would result in either a large loss or a large gain."
> (1981: 11)

Greene suggests this may not be the case -

> "While there is some evidence that risk taking behaviour in some areas (gambling), carries over to risk taking behaviour in other areas (business situations involving risk) the results are somewhat tenuous. Results of the experiment did not produce evidence that insurance buying behaviour can be predicted from risk taking behaviour in other areas."
> (Greene, 1964: 37)

There does appear, however, to be some inclination within individuals that permits a level of risk to be 'acceptable'. Over this threshold risk-taking becomes a problem that either

requires a person to remedy it by way of purchasing insurance, or adopting a psychological defence mechanism.

5.11 Attitudes Towards Insurance

There have been some statements which attempt to provide an 'overview' of the person who may be 'typical' of natural disaster Insuring Man. Rydant, for example, has suggested that -

> "In general, they characterized the insurance adopter as a repeat buyer, with a higher income and generally greater awareness of hail hazard than farmers who do not adopt crop-hail insurance. The adopter expresses general satisfaction with insurance company operations (including hail, life and property insurance) and appreciates the worth of crop-hail insurance, perhaps because he or she perceives a high probability of sustaining a loss.
>
> (Rydant, 1979: 319)

Others have provided more specific indices of the Insuring Man -

> "The highly educated and presumably more intelligent person is more likely to be an insurance buyer than the less educated person. Insurance has the definite purpose of narrowing the range of uncertainty within which the purchaser operates, thus confirming the finding that more intelligent persons do not want to play the long shot."
>
> (Greene, 1963: 169)

Income is a socio-economic variable which has also been considered -

> "The level of annual income seems to vary independently with basic attitudes towards insurance. Thus no more high income subjects believe that 'most people tend to become insurance poor' than those subjects with low incomes."
>
> (Greene, 1964: 37)

Relating risk-taking probabilities with the purchasing of insurance, particularly natural disaster insurance, several studies suggest that the relationship is certainly not well-defined, and could in fact work contrary to the development of widespread natural disaster insurance purchasing.

> "Most insurance policies are designed to protect an individual against a low-probability event which may produce relatively large losses. But as we have seen, individuals find it difficult to assess the probability of these events or to estimate the potential losses. Furthermore, they have little interest in actively seeking information on insurance protection."
>
> (Kunreuther, 1976: 250)

It is thus not surprising that few individuals have protected themselves against the consequences of a disaster -

> "An average person conceives of small probabilities to be larger than they actually are. He is therefore more likely to purchase insurance against a loss with only a small probability of occurrence than he would if he conceived the probability to

be as small as it actually is."

(Greene, 1963: 166)

"People would be more likely to underestimate the probability and therefore pay less for avoiding the risk of loss."

(Greene, 1963: 167)

Another insight gleaned from Kunreuther and Slovic's laboratory and field survey data is that people think of insurance as an investment. Making claims and receiving payments by insuring against more possible losses seems to be viewed as a return on the premium. Hence -

"Insuring against hazards that don't occur seems a waste of money."

(1978: 67)

Referring to the public response in purchasing flood insurance within the United States, Luloff and Wilkinson note that -

"Contrary to the expectation of program officials, initial response (by the general public) was low."

(Luloff and Wilkinson, 1979: 138)

"No relationship was discernible between risk attitude and insurance buying behaviour."

(Greene, 1964: 31)

Even when insurance has been purchased, however, some suggest the utility value of having it may diminish with time -

"Recency of purchase of insurance appear to affect attitudes toward the particular coverage purchased. Those who have recently purchased insurance have a more favourable

attitude towards it."

(Greene, 1964: 37)

Kunreuther's assertion below, then, should not come as a surprise, however depressing it may be for disaster managers and insurance executives -

> "Most people show no interest in insuring themselves until they or their friends have been personally affected by a disaster."
>
> (1978: 29)

Finally, Greene (1963) suggests that there is evidence which indicates -

> "... that individuals possess a basic set of attitudes toward risk and these attitudes affect importantly their attitudes toward different types of risky economic alternatives."
>
> (1963: 180)

5.12 Attitudes Towards Hazards

Findings similar to ones found for attitudes related to insurance have also been found for natural hazards. Thus, from a study centred on flood- and earthquake-prone locations, in 40 American cities, Kunreuther and his colleagues concluded that -

> "On the basis of these results we concluded that most homeowners in hazard-prone areas have not even considered how they would recover should they suffer flood or earthquake damage. Instead, they treat such events as being so unlikely that they ignore the consequences altogether."
>
> (Kunreuther, 1978: 32-3)

> "A large percentage of uninsured individuals in both flood- and earthquake-susceptible areas estimate the probability of a severe disaster to be 1 in 100 000 or less (i.e. almost impossible). Some of these uninsured individuals may estimate such a low probability not necessarily because they really perceive the chance of a flood or earthquake to be so small, but rather as an ex post justification for their current uninsured status. The same bias may be true with insured homeowners who estimate a high probability of future flood or earthquake."
>
> (Kunreuther, 1976: 235)

In Palm's study on earthquake-related aspects -

> "Of the 207 homeowners only 18 (8.7%) indicated that they had earthquake insurance, although 52 (29.3%) believed that a major earthquake will definitely or probably occur in the area while they are living there. Those who believe that a major earthquake is likely to occur while they are living in their present house are no more likely to purchase earthquake insurance."
>
> (Palm, 1981: 56)

6 Insurance Factors

The relevance of the insurance policy and the policies and practices of the company, together with the insurance agent, are of immense importance in determining the actions of individuals to their insuring behaviour.

The following studies highlight the role of the policy, the

coping and the agent. In order to be consistent with our approach, we have subdivided this category into three: cost of premiums, insurance company policies, and actions of insurance agents. The probability of insuring against natural hazards has been expressed in terms of these three insurance factors (I_F) thus -

$$I_F = f \left[\text{COST OF PREMIUMS} \right] + \left[\text{INSURANCE COMPANY POLICIES} \right] + \left[\text{ACTIONS OF INSURANCE AGENTS} \right] + P_A$$

6.1 Cost of Premiums

Cost appears to be a rather important consideration for the person who wishes to consider obtaining natural disaster insurance, even though a person's income has been described as an independent variable -

> "The relative cost of an insurance policy undoubtedly influences the decision (to buy). In general, the higher the premium the greater will be the resistance to adoption."
>
> Rydant, 1979: 315)

> "The cost of flood insurance is often prohibitively high to individuals (in the U.S.A.)."
>
> (Luloff and Wilkinson, 1979: 138)

> "One might expect a low adoption of flood insurance among low income groups because they cannot afford it, and among high

> income groups whose large assets provide them with a sufficient margin or protection."
>
> (Bauman and Sims, 1978: 192)

Rydant has expanded on this -

> "Insurance adoption rates ordinarily reflect the individual's income status, with those persons in the lower income brackets generally purchasing less insurance or fewer policies. Income may influence the adoption decision in several ways ... The adoption of insurance, however, is not an all-or-nothing situation that is, varying degrees of protection may be purchased. The effects of income may therefore be felt in two other ways:
>
> 1 low-income farmers may be more likely to purchase small amounts of crop-hail insurance, yet have high rates of adoption; and
> 2 high-income farmers may purchase insurance to a lesser degree than low-income farmers because they have a greater ability to withstand a hail loss."
>
> (Rydant, 1979)

6.2 Insurance Company Policies

The activities and practices contained within insurance company policies play an integral role in the viability of insurance programmes as a means of mitigating natural hazard effects and as a device for individuals to consider as an alternative to existing mitigatory schemes. The uncertainty of the phenomenon itself, however, makes natural disaster insurance almost as much a gamble for the insurance company,

or its reinsurance agent, as it does for the private individual -

> "When referring to natural hazards, there are certain inherent features which pose major problems for the insurance industry. The most obvious of these are the general lack of adequate statistical data with respect to frequency of events and the damage potential of specific hazard occurrences. This means that an accurate assessment of risk is virtually impossible to obtain. The writing of disaster insurance is thus a gamble which can be accepted only if there is an institutionalised procedure for underwriting losses fully."
>
> (Britton, 1982b: 302)

The following excerpt from Petak and Atkinson's publication indicates in a rather explicit manner the uncertainty - or gamble - that insurance companies also take in ensuring not only the continuation of a policy-type, but indeed, the decision to offer a policy-type for high risk ventures at all in the United States, for example -

> "As the industry's assessment of its ability to accurately predict risk declines, the prices for the service rise, or may not be offered at all. When a solid actuarial base of information concerning the probability of loss to particular persons or properties under particular defined circumstances is missing, the price goes up or the industry's willingness to engage in the service goes down. When the industry's perception of its capacity to predict the coming and going of loss-producing events goes down, the price for its

> services goes up, and its willingness to extend the services goes down. When wild fluctuations, from year to year, can be anticipated in the volume of losses that will be sustained among policy holders, the requirements for reserve accumulations goes up, the difficulties of the industry in coping with regulatory requirements and I.R.S. policies are escalated, and the industry's interest in extending the service goes down and, sometimes, the price of the service, when extended, goes up."
>
> (Petak and Atkinson, 1982: 454)

Still, it is clear that the policies of insurance companies are influential in considerations relating to a variety of insurance aspects. Some of these are illustrated in the following abstracts. It has been hypothesised that it is the context of the decision which affects the behaviour under conditions of risk -

> "In the case of insurance sales, it has been noted that commission return to insurance salespersons may affect the purchase of insurance more than any objective determination of probable benefits or losses by consumers."
>
> (Palm, 1981: 13)

> "Our study has led us to conclude that the primary cause of failure in the disaster insurance market is consumer disinterest. If insurance is to be marketed on a voluntary basis, then consumer's attitudes and information-processing limitations must be taken into account."
>
> (Kunreuther and Slovic, 1978: 67)

"It is clear that there is resistance on the part of many elements of the American insurance industry to any mandated system of natural hazards insurance and a pervasive fear that any federal intrusion whatsoever into this field would lead either to unwanted federal regulation of the insurance industry, or to requirements that might threaten the financial viability of the existing industry."

(Petak and Atkinson, 1982: 445)

"Although federally subsidized flood insurance is now available and commercial insurance against selective other natural hazards is now offered by some companies in some parts of the United States, it is not generally possible at present for property owners to purchase all-purpose natural hazard insurance coverage and, therefore, to take advantage of this means for avoiding catastrophic losses arising from natural hazard exposure. The absence of this opportunity probably directs undue attention to other methods for mitigating potentially catastrophic natural hazard losses, including those related to provision of area protection facilities and to use of building-strengthening technologies. From a cost-benefit point of view, insurance coverage may well be a better solution to some aspects of the loss problems associated with natural hazard exposures than other approaches. At the very least, insurance can be an important partner in a comprehensively oriented loss-reducing strategy.

(Petak and Atkinson, 1982: 380)

Some researchers have also offered small insights into the Australian situation. Thus -

> "The Committee of Inquiry into the Australian Financial System (the Campbell Report), referring to concern by the Insurance Commissioner, stated that the premium rates within Australia for insurance policies are being set at levels which do not reflect sound underwriting practices. If these practices were to continue, the Report states, and should there be a significant natural disaster, the consequences for the insured and the policy holders would be very serious. The implications expressed by these statements suggest that some insurance companies are finding it difficult to attract clients and are therefore attempting to gain business by attracting more policies by offering reduced premiums which are not financially sound in the long term."
>
> (Britton, 1982b: 311)

> "There is ... a problem of both the federal government and some members of the insurance industry (in Australia) in accepting the necessary legislation for the compulsory participation in the arrangement of a 'pool' fund."
>
> (Britton, 1982b: 311)

6.3 Actions of Insurance Agents

The significance of the agent-client interface is also critical, much more than probably is imagined by most insurance company personnel.

> "If most individuals treat insurance as an investment, then one of the principal functions of the agent should be to educate the policyholder that the biggest return on one's policy is not to have any return at all. Unless the homeowner adopts this point of view he is likely to purchase a flood or earthquake policy only after suffering damage, and to cancel his policy several years later because he has not received a return on his investment. Such a process of education is likely to be slow and tedious unless the agent plays an active role."
>
> (Kunreuther, 1976: 252)

> "Home owners, and particularly those who had moved into the area from out of the state, were therefore not only unlikely to have heard of earthquake insurance, but were unlikely to learn about such policies either from the home sales agents or the insurance agencies."
>
> (Palm, 1981: 66-7)

Meltsner's observation may provide some explanation why this is so - the insurance agents may not be convinced of the necessity themselves to purchase specific natural hazard insurance policies.

> "Even people in the earthquake insurance business do not purchase earthquake insurance."
>
> (Meltsner, 1978: 167)

7 Conclusion

The 160+ abstracts and 32 variables which we have taken from the available literature dealing with natural hazards, insurance, or risk-taking, suggest that the probability to insure against natural hazard threat (P_I) may be represented by the following formula -

$$P_I = \int (S_A + I_R + A_A + P_A + I_F)$$

Whereby the probability of insuring against the consequence of a natural hazard event (P_I) is a function of the objective knowledge of the natural hazard problem, that is salience (S_A), plus information which is relevant to the phenomenon under consideration (I_R), plus the accuracy of the awareness of natural hazards (A_A) - that is, experience, together with the probability of adopting hazard mitigating devices (P_A) and the actions of insurance companies (I_F).

We fully recognise that our study is an exploratory venture and hence is incomplete and may be tenuous in its findings. We are very aware, for example, that researchers working outside the confines of the insurance and natural disaster relationship have suggested other variables which are relevant to a more complete understanding of the decision-making processes which could lead to the purchase of natural disaster insurance. We are cognizant of the knowledge, for example, that the quality of housing stock, the type, and intensity of the hazard event, and the distributional effect of hazard consequences (both in terms of geography and social impact) are also important features of natural hazard research that warrant consideration for a truely reliable model of the type which has been looked at in this paper. Nevertheless, we believe that although the number of publications which we consulted were relatively few in number (no more than 70 pieces of research were consulted in total), the five general variables we have employed, together with the 32 specific variables highlighted in the paper represent a significantly greater spread of the research that has been conducted in the area of insurance and natural disaster. We

maintain that what we have attempted to undertake in this paper is a codification of some of the existing literature. It was not our intention to go beyond the findings of the topic we chose to review, save for the studies which we identified at the beginning of our paper which were essential to contextualize our efforts at codification.

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