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STATE OF THE ART IN DISASTER PREVENTION AND MITIGATION

SOCIAL AND SOCIOLOGICAL ASPECTS

A COMPENDIUM OF CURRENT KNOWLEDGE

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Introduction

DISASTERS AND NATIONAL DEVELOPMENT

Each year, on average, about a quarter of a million people perish in disasters. At least ten times this number are seriously affected by injury, pain, grief, disability, the loss of income, home, and treasured possessions, and the ensuing disruption of personal and community life. The economic effects ripple out to an incalculably greater number and often, via taxation, are extended to the whole population.

Four natural hazards are responsible for 90 percent of all loss of life and damage to man and the environment. These are drought, floods, tropical cyclones and earthquakes. Other hazards such as volcanic activity, tornadoes, landslides, avalanches, fires, hail-storms, and extremes of temperature -- which cause disaster on a local scale -- are of lesser significance. Vagaries of weather account for more than 50 percent of both the loss of life and property damage.

Natural hazards impose a levy on the global economy which runs to at least $40 billion a year. Of this, probably $25 billion is sustained in damage and the remainder in the cost of prevention and mitigation. The size of disasters varies enormously but $350-500 million might represent the "average" loss (Burton et al 78:2). For poor countries the damage caused by natural disasters may at times exceed the value of financial aid received from abroad.

mean loss for the period 1965-69, expressed as a percentage of GNP, was 0.8-0.9 percent. In the period 1955-63, with several large disasters, the loss was as high as two percent of GNP (Nakano 74:232).

The Economic Commission for Latin America has estimated that, in the five countries of the Central America Common Market, disaster damage has averaged 2.5 percent of the gross domestic product in the ten years 1960-1970. This figure represents only direct material damage (UNEP 77:2). The Economic Commission for Asia and the Far East (ECAFE 72) estimated that in the fifteen countries of that region, on average each year from 1960 to 1970, 7,396 lives were lost, 22.5 million people were affected, 9.6 million hectares were inundated, and 1.4 million buildings were damaged. The annual damage was valued at $895 million. In the same period, monsoons, tropical cyclones and floods in the ESCAP region have been estimated to cause damage of $29,800 million (1974 prices) with an annual average of $2,190 million. Two hundred and eighty thousand lives were lost, 485 million people affected, 139 million hectares inundated, and 35 million dwellings and buildings damaged (UNDRO 76:5. The figures exclude Afghanistan, China, Indonesia, Iran and a number of other countries in the region).

Roughly half of all loss of life and damage is the result of large-scale happenings. Bangladesh lost 300,000 people to the cyclone of 1970, 100,000 more than perished in the civil strife associated with independence. Earlier the same year, Peru lost 66,794 of its people in an earthquake and suffered destruction estimated at $530 million (Baird et al 75:28). A recent study

In some disaster-prone developing countries, losses due to natural disasters
seriously affect the economic growth that might have been achieved. The
Tangshan earthquake of 1976 may have taken as much as one percent of China's
expected growth in gross national product (Strauss 76:9). Losses from the
earthquake in Guatemala in the same year have been estimated to total from two
to three billion dollars, or between 65 and 100 percent of the country's GNP
for one year. If these figures are correct, the per capita damage sustained
by 1.5 million Guatemalans amounted to between $1,300 and $2,000. This was
three to four times the GNP per capita (Yu and Haussmann 77). To restore
Managua city victims of an earthquake in 1972 required an expenditure equal to
the entire annual value of Nicaraguan goods and services. In a country where
the per capita GNP is about $350 per year, 75 percent of Managua's population
lost, on average, property and income equivalent to three times that amount
(Kates et al 73:985). The Economic and Social Council of the U.N. estimated
that as a result of Hurricane Fifi in Honduras in 1974, the economy of Honduras
shrank by six percent. Fiji lost between 2.3 and 4.6 percent of its GNP as a
result of Hurricane Bebe (Gane 75:9; a high estimate). In Tanzania, a major
drought can sometimes diminish crop yields by as much as 30 percent. This is
equal to a four percent reduction in GNP. Preventing half this loss would be
equivalent to 20 percent of the total current investment in the country's
development. Similarly, in Sri Lanka, where in an average year floods cause
a reduction of $30 million in the value of agricultural crops for domestic
consumption, the elimination of 50 percent of all flood damage would raise the
nation's growth rate by 0.6 percent (Burton et al 78:16; Hewapathirane 77).
Even in Japan, which has a very high rate of economic growth, the annual

of global trends in natural disasters has observed that, while the global number
of disasters has been dropping over the period 1947 to 1973, the area which
these disasters encompass and the deaths associated with them has been
increasing (Dworkin 74).

These figures can be taken only as very general indicators of the magnitude of
the problem. In poor countries, few exact records are kept of acreage farmed
or yields returned. Farmers hesitate to generalize about their experiences and
rarely claim knowledge of the experience of others. As there is no uniform
basis for estimating damages in different countries, the comparison of losses
in absolute terms, or as a fraction of GNP, is quite meaningless. In many
cases local materials and family labor are used in construction for which
market prices are lacking. Schedules of damage which are compiled for the
purpose of assessing rapidly the extent of need are frequently unreliable for
the purpose of evaluating total losses. The many expenditures of effort,
resources, and sacrificed opportunity which are made in order to cope with an
emergency are rarely recorded. The problem of pricing subsistence crops also
arises.

Some effects take a long time to show themselves. In Fiji, replanted coconut
trees take up to six years before they begin to bear fruit (Gane 75:3). After
a drought it may take several years before cattle herds fully reestablish them-
selves. In pastoral areas of Africa, a serious undersupply of milk can be a
problem for six to twelve months after the meteorological end of a drought
(Wisner and Mbithi 74:90). A decrease in milk supply can, with other

drought-related factors, precipitate clinical malnutrition among children of weaning age. The adverse long-term effects of malnutrition on the mental development of children is a serious if elusive cost to be attached to the disaster's account.

There are enormous conceptual and practical difficulties to estimating losses of any kind. Income and production accounts are never refined enough or dis-aggregated sufficiently on a regional basis to permit analysis. Even if national accounts are available, one needs to know a great deal more about how people value different aspects of their life which may be disrupted by a disaster. What price, for example, would an African herdsman attach to "leisure" forgone; how does a Bangladeshi farmer rate the productive capacity of his children? The disruption of life, the losses of real and symbolic wealth, are not easily assessed, counted or scaled. Indeed, the common units of measurement employed for physical delimination may be unsuited to the assessment of social impact.

The anti-developmental effects of a disaster cannot be measured, or even out-lined, solely in economic terms. While loss of family members in subsistence economies may impose a strain on labor resulting in a loss of production, it may also cause the abandonment of risky innovations which have potential for stimulating economic and social development. Having to cope with a disaster of any type imposes considerable non-economic strains on a household. Hunger suppresses all activities that fail to promote its satisfaction (Sorokin 42:51). When supplies are disrupted, carrying water may occupy an enormous proportion of available effort. The high cost of social dislocation includes the

irreplaceable loss of employment or business, residence, possessions, and familiar surroundings. It also includes the loss of irreplaceable property or compensable losses that go uncompensated due to the ignorance or pride of the victim, or due to the inequity and inefficiency of the relief system. On the national level, the inegalitarian distribution of the effects of a disaster can play havoc with any development policy for social equality and income re-distribution.

One further way in which disasters can have a serious effect on development is by assisting in the global process of ecological degradation. Floods regularly bring benefits in renewing the fertility of flood plains, and tropical storms do provide much of the moisture needed for agriculture. But both of these phenomena can cause the erosion of valuable topsoil from the face of the earth. Drought too can lead to the destruction of pasture and subsequent desertification. The loss of vegetation means that future erosion will proceed even more quickly. Since many people in Third World countries depend on agri-culture for their livelihood and must continue to do so for a long time to come, this problem is directly related to future prospects for rural development and, ultimately, for urban survival (Ball 77; Eckholm 76).

The amount of damage heaped on man and his environment bears a close relation-ship to the prevailing level of economic development. The more a society depends on complex technology, the greater is the potential for disruption when disaster does come along (McLuckie 70). But societies which have much to lose in terms of buildings, utilities, transportation and communication networks, also tend

to have the technology which ensures better monitoring, warning, evacuation and relief. All of this contributes to the lowering of the death rate, while damage in monetary terms increases. Conversely, countries having less developed material infrastructures do not suffer such large property losses, but pay the price in human lives.

Pre-industrial societies have evolved ways of coping with the vagaries of the environment which are more cooperative with nature than controlling it. Their methods of survival are low in capital requirements and typically demand action only by individuals or small groups. Consequently, their coping mechanisms are flexible, easily abandoned or added to in times of crisis, and vary greatly from one community to another. Industrialized societies on the other hand use a more limited range of measures to cope with hazard, but these place heavy emphasis on capital-intensive, technological solutions. They become standardized, relatively inflexible, and depend for their success on an interlocking, inter-dependent social organization (Baird et al 75:34; Burton et al 78:217; Kates et al 73:982).

The more industrialized countries have, therefore, some means for preventing what are, in the less developed economies, routine losses. However, as the density of population and investment increases -- especially in hazardous areas -- the more occasional but catastrophic losses spur them to seek other ways of reducing nature's toll. Changes in land use, relocation, the enforcement of building codes, and the initiation of effective warning systems, for example, become acceptable.

In contrast, the economies of developing countries present a more serious picture in vulnerability to disaster. As their economies become more heavily urbanized, and as the rural sector becomes increasingly oriented towards external markets, the variety of adaptations which people can make to their environment diminishes. Individuals become more enmeshed in the wider economy which, in order to expand, siphons off the wealth which the individual produces. Unfortunately, the same process reduces the individual's adaptive capacity to sustain loss (Baird et al 75:33; Burton et al 78:220-3).

It is therefore among the nations in transition in which the most serious losses from disaster can be expected. Those whose people are being separated from their traditional way of life, but which have not yet reached the stage where they can afford comprehensive and multifaceted protection, will be the most disaster-prone. The trend towards more intensive exploitation of natural resources seems likely to bring increased economic loss in its wake. At the same time, expanding rural populations will ensure that losses in the more traditional sectors will continue. The pressure on land and the super-rapid concentrating of people in cities will make the finding of any solutions very difficult. The same devices which have served in the West to mitigate loss will not necessarily work in countries with quite other social systems and cultural values. The very poorest nations, or those which are developing most slowly, are not so likely to suffer such large losses as those with slightly higher per capita incomes. In proportion to their population sizes however, losses may be higher. Loss of property is most likely to grow in the rapidly developing countries, especially those with coastal locations and those

exhibiting large inequalities of wealth. In developing nations with widespread

sharing and self-reliance, and in the few industrialized nations moving towards

a wide range of preventive measures, losses can be expected to diminish. Over-

all, however, the world is likely to see a substantial increase in disaster

losses in the short term.

Chapter One

SOCIAL EFFECTS OF DISASTER

This chapter reviews what is currently known about the social effects of disaster under four headings: effects on the individual and the family; on the community; on the government sector; and on the fabric of society -- providing opportunities for change. The chapter concludes with a review of those factors which exacerbate the impact of a disaster and which therefore give clues to the measures which might be adopted in disaster prevention, mitigation and relief.

It must be remembered that the scraps of insight from sociological research and intelligent social observation which have here been welded together have been drawn from many quarters. The assembly of disjointed observations made at many different times in many different places does not add up to a smooth and rounded exposé of the subject. Few of the generalizations can be true for all types of disaster in all societies. Within any one country, there will be differences between regions and, within regions, between communities. What is presented here must be looked upon as a catalogue of others' experiences, not as a prediction of what will happen in any one society. As in any catalogue, there are gaps and omissions. One of the reader's tasks will be to look for the gaps, and to ask how they might be remedied.

1.1 EFFECTS ON THE INDIVIDUAL AND THE FAMILY

The behavior of individuals confronted by a disaster varies enormously, both from situation to situation and from person to person. Some events are more traumatic than others. Sudden, violent disasters have been known to produce a type of shock in victims. This manifests itself as stunned insensibility to what is going on, aimless staring into space or wandering about, followed by a-rational feelings of euphoria, unusual suggestibility, and a tendency to minimize one's own losses by comparison with those of others. This "disaster syndrome" as it has been called, affects only some of the population and is usually of very short duration. Within minutes or hours, most victims who have not been physically incapacitated, apply themselves to rescue and the answering of their immediate needs (Fritz 61:672; Quarantelli 60:73; Wallace 56).

Under stress, most people behave in ways which are entirely rational. Contrary to the popular image of victims who are stupefied and defenseless, most of the able-bodied are remarkably resourceful in adapting to new circumstances. On-going role obligations and the social structure in which people operate usually provide sufficient guides to what they should do in restoring their lives to normal (Dynes and Quarantelli 73:1).

Characteristics of disaster which may increase the stress for an individual include: suddenness; uncertainty; prolonged duration; broad scope of impact, physical destruction, death and injury; exposure of the dead and badly injured; and timing, be it day or night (Mileti et al 75:61). The previous psychological

and social disposition of the victim also influences the subjective experience

of disaster. Behavior is affected by many factors. These include: beliefs

concerning the divine or natural causes of disaster; knowledge, experience, or

training in the avoidance or prevention of further danger; beliefs as to what

one's proper role should be in the emergency; the degree of identification or

affiliation with groups which are threatened or injured; one's social stake

with respect to the chances of securing aid, relief, or special advantage;

the strength of need to be dependent on others; and level of concern or anxiety

with respect to cleanliness, privacy, or personal integrity (Janis 54:21).

The intensity of emotional reaction to a disaster will vary according to

whether or not one is surrounded by members of one's family or by some other

psychologically supportive group. Even in societies where formal social

organizations have replaced many of the functions of the family, it is found

that in disasters of sudden onset, families prefer to move together and to

remain together (Drabek 69:346). If separated, they will try hard to unite

(Mileti et al 75:71). Persons separated from their families during a disaster

have been known to register a higher frequency of emotional difficulty than

persons not separated (Fritz 57; Fritz and Marks 54; IVSO 55:17; Killian 54:69;

Mileti et al 75:62).

Both men and women suffer disorientation as a result of being denied the oppor-

tunity to perform their usual roles in relation to the family. In evacuation

to a refugee camp where food is provided, women find that they have neither

the duties nor the status associated with the family cook (Stoddard 61:151).

Men who are put out of work by the disaster are similarly denied a means of performing their manly role and may suffer additional anxiety as a result.

Although very little is known about the psycho-social effects of disaster on children, the studies which have been undertaken suggest that they are usually minimally disturbed if a parent is with them. If they are separated from their parents at the time of the disaster, serious disturbance may result (Farber 67). If the child is sufficiently removed from the trauma of impact then, other than by the influence of the parent, the child is unlikely to comprehend the catastrophe or to be affected by the associated fear and anxiety (Lessa 64; Perry and Perry 59; Perry et al 56).

The social effects of a disaster will depend partly on the meaning or significance imputed to it by the particular culture in question. There are many types of "explanation" for the cause of a disaster. Science, which offers hope for the control of nature, is only one of many such explanation systems. Traditional societies have normally been obliged to accept loss and suffering as an integral part of daily life. Acceptance of fate is often so entrenched that it is difficult to assess the personal impact of disaster, or even to discuss it properly (Caldwell 75:59). The supernatural is invariably seen to be instrumental in awesome events, but man's own wrongdoings or an imbalance in his relationships with his fellow man is often seen to be more immediately responsible (Davis 70:142; Prasad 35; Schneider 57:13). That the bad years are as much a part of the totality of existence as the good years, is an attitude deeply embedded in many cultures. The degree to which fatalism pervades

varies from culture to culture and from individual to individual. Generally, the older members of the community, the women, and the less well educated will be more prone to passivity and acceptance.

The economic impact on the individual and on families can be severe. The loss of husband and/or wife, either or both of whom may have been breadwinners, will be serious. A reduction in total family income may also be due to the fact that fewer other family members are able to hold on to or to find jobs with which to contribute to the family budget (Trainer et al 77:195). New demands on income will inevitably make themselves felt. The renting of temporary accommodation; the payment of additional medical bills; the repair, rebuilding, and refurnishing of one's home; and the care of less fortunate relatives will all contribute to strain family resources and, inevitably, harmonious domestic relationships. The unfortunate results on children of a curtailment in family income include their being kept from normal schooling (Trainer et al 77:203), either because their parents cannot afford the fees or because their labor is needed to bolster the family income.

At the same time that consumer prices are rising, the demand for the victims' production or services may be falling. Peasants who try to market their cattle in order to save themselves from drought find that, when everyone else is doing likewise, the bottom falls out of the market (Caldwell 75:49). Similarly, where many resort to the selling of labor, or handicrafts, as a means of raising extra cash, wages and income from the non-food produce are likely to fall steeply (Caldwell 75:51). The semi-skilled and the unskilled fare worst

in a situation of intense competition, but those in the higher socio-economic

strata whose services are peripheral to the satisfaction of basic needs, for

example lawyers or dentists, may also find it difficult to maintain their

incomes (Trainer et al 77:157,196).

In societies where wealth and social status are closely allied, the accentuated

difference between the economically more fortunate and those less well off may

reflect itself in a shift in the distribution of prestige. He who retains his

large herd of cattle (Johnson 73) or is able to continue to afford his subscrip-

tion to an elite circle (Trainer et al 77:157) acquires or retains increased

influence over his fellow citizens. Patterns of home ownership too may change

(Trainer et al 77:201) as families strive to make the best they can of the

market situation. In an economic atmosphere which does not encourage building

for rent, home ownership may be the most viable solution for those who can

afford the loan repayment schedules. As home ownership is generally considered

socially superior to renting, a disaster can juggle with social status differen-

tials in this way also.

Those who do succumb to stress produced by any or all of the above factors may

suffer from periods of depression, dejection, restlessness, fatigue, nervous-

ness, irritability, sleeplessness, and various psychosomatic symptoms including,

most frequently, stomach upsets and diarrhea (Mileti et al 75:103; Taylor et al

76:8; Webber 76:58). In famine, unreasonable irritability, anger, rage and

vindictiveness have been said to occur on a mass scale (Sorokin 42:19), although

listlessness and dull-eyed disinterest in the world is more frequently reported

as being the result of starvation.

The nature and extent of serious long-term psychological disruption is a matter of dispute (Bates et al 63; Drabek and Stephenson 70; Drabek et al 73; Erikson 76; Form and Nosow 58; Hall and Landreth 75; Marks et al 54; Moore 58; Moore and Friedsam 59; Moore et al 63; Titchener and Kapp 76; Zusman et al 73). Longer-term symptoms have reportedly included disorganization and sluggishness in thinking; difficulty in controlling emotions; emotional insensitivity; hallucinations; delusions; nightmares; and phobias about anything which reminded the victims of the disaster itself (Titchener and Kapp 76:296). The incidence of anxiety, sleeplessness, irritability and domestic tension may even increase with time, as the return to a routine existence gives people more time to dwell on their losses and worry about an uncertain future (Trainer et al 77:192).

Although the treatment of individual victims is more a medical problem, social scientists are interested in the conditions which make for psychological casualties. For example, it is known that when a disaster happens, the bonds of kinship and neighborhood are extremely important in providing people with a sense of security and in minimizing the psychological trauma. Where a disaster causes great loss of life, or scatters people more or less at random throughout the vicinity, then the old ties are no longer present to give meaning to life. The realization that the family or community no longer exists as one knew it can be extremely painful and present many practical problems which make adjustment difficult (Erikson 76:302-4; Haas et al 77:41; Webber 76:61).

The apparently irrational behavior of homeless people in attempting to cling to a former place of residence, a now unattainable idea or now unavailable occupation, can be interpreted as a form of bereavement. The impulse to cling

to features of the previous situation, however unrealistic, constitutes a
refusal or inability to deny the meaning and importance of the lost relationship
and is an important part of mourning (Loizos 77:239; Marris 74; Trainer et al 77:
179-80). For each victim, there is a loss which cannot be expressed in sums of
money; a loss which is non-compensable. Even when relief or resettlement
policies are designed with their welfare explicitly in mind, victims may be
extremely ambivalent towards their new status and slow to take up new opportunities.

1.2 EFFECTS ON THE COMMUNITY

Many observers have commented on the outpouring of concern for others which is
exhibited after a sudden disaster. This spontaneous burst of altruism is often
combined with a temporary blocking out of awareness of personal injury or loss.
People have been known to salvage valued community property, for example a
church (Davis 70), or even seek to rescue esteemed community leaders (Foreign
Language Press 76), before taking care of their own families or themselves.
This altruistic behavior begins with rescue work and may last for days or even
weeks after impact (Barton 69:206). The need to rescue, salvage and reorganize
daily living are so acute and so bound to community survival, that a consensus
of what needs to be done is readily achieved (Fritz 61:684). The welding of
the community together makes suffering and loss easier to bear. Information
about the needs of others is shared and the personal warmth and direct help of
the community enable the afflicted to meet the crisis (Barton 69:206-7; Dynes
and Quarantelli 73:10).

Where the effects of the disaster cut across existing social boundaries, people are able to recognize that others are basically like themselves (Barton 69:245). A feeling of belonging and a sense of unity grow up among fellow suffers, giving rise to a solidarity which may be impossible to achieve at normal times (Bates et al 63; Crawford 57; Fritz 61:684-9). For a while, social relationships take on a primary-group quality -- intimate, personal, informal, sympathetic, direct, spontaneous, and sentimental (Dynes and Quarantelli 73:10-11; Fritz 61). In the hours or days after impact, joint action for a common purpose in answering need often generates a utopian spirit. In this period, internal conflict is at a minimum. The urgent needs distract attention from wider issues and focus efforts on immediate problems. There is a perceived unity of need and a need for unity (Dynes and Quarantelli 71). The fact that the evil responsible for the disaster is (most usually) seen to be outside the control of any faction, likewise facilitates a collective spirit.

However, where such a therapeutic community response does arise, it generally lasts for only as long as the immediate urgency is apparent. As neglected private interests become more pressing, helpers are drawn back to their daily preoccupations. Where the impact of the disaster is drawn out, as is the case with an epidemic or drought, it is doubtful whether the same kind of spontaneous upsurge of altruistic activity can be expected as is the case with a sudden calamity (Wallace 56:22).

An increase in social solidarity within the stricken group is not infrequently accompanied by an increased intolerance of outsiders (Barton 69; Dacy and Kunreuther 69; Davis 70:125; Demerath and Wallace 57; Dynes 70; Spillius 57).

The bearers of aid have repeatedly been the butt of a new-found spirit of unity among the victims. Also, as a disaster often appears to strike in a random way, some families escape loss while others suffer bereavement. This can create strong feelings among those who experience intense personal loss; feelings of hostility which separate them from those families which escape intact.

While, in the face of calamity, people of different social classes may pull together for brief periods, felt differences in status and role tend to reassert themselves when the crisis has passed and the allocation of relief becomes a source of contention (IVSO 55; Taylor 76a). In spite of the fact that disasters are often supposed to break down inhibitions, the evidence is that values and social norms remain substantially unchanged by disasters of relatively brief duration. Attitudes towards modesty, privacy, and the keeping (or not) of the law are likely to remain unaltered (Quarantelli 60:77; Quarantelli and Dynes 70).

It is often supposed that looting becomes a widespread problem after a sudden disruption in a community's life. Whether such opportunistic behavior occurs or not will probably depend on the social norms prevailing in the community prior to the emergency. In a society where property is widely respected and defended by all, then looting is unlikely to be a problem. Disasters do not "cause" looting or other anti-social behavior. What happens is that the general disruption allows any existing but hitherto frustrated drives to be played out, now unrestrained by the forces of law and order. In a society where the differences between the rich and the poor are great, and where these differences are maintained by physical barriers, then the temporary breaching of the security system will allow full reign for normal impulses.

A disaster will generate shortages by virtue of the physical destruction of
buildings or commodities (a fall in supply) or by virtue of an increased demand
for those goods and services which are needed to restore normality. The deliberate
hoarding of scarce resources for the purpose of profiteering may also be a problem.
In practically any disaster with sudden onset, commodity prices go up. Where
damage is widespread, building materials particularly will be subject to price
inflation. Where houses are destroyed, rents too can be expected to rise to
balance out the supply and demand. The competition for scarce resources may
result in bitterness, and even fights, between the needy, especially when access
to the resources at stake (for example water) represents life or death (Caldwell
75:52). Ethnic or cultural difference between those in competition for resources
will add fuel to the fire of any pre-existing animosity or suspicions, especially
if the competition is seen as a challenge to the supremacy of some superior
status group (Rosene 76). Attempts to obtain unfair access to relief goods by
impersonation (Hinshaw 76:3), fraud, or other means, not infrequently leads
to acrimonious rancor between individual victims and/or between neighboring
communities. Where there is an influx of migrants searching for work, resident
locals are liable to feel their interests threatened. Even if the newcomers do
not despoil the environment and pillage for food, they are likely to increase
competition for jobs and drive down the cost of local labor (Caldwell 75:30).

Evidently, one man's salvation can be another man's loss, and one man's misfor-
tune another man's gain. What is catastrophic for one section of the community
may be a boon to another. Producers outside the affected area can be expected
to benefit at least temporarily as a result of the decline in competition
(Renshaw 61:38). The economic processes which concentrate productive capacity

in fewer and fewer hands are accelerated by a disaster (Bowden et al 77:117-9; Meredith 72). Those who have knowledge and access to community and institutional resources prior to the disaster continue to profit from their positions after the event. Those with high positions in the hierarchy of commerce, industry, and residence are generally better placed to reestablish themselves when the dust settles or the waters recede (Sjoberg 62:358). But there are many hidden victims. Those who have not suffered direct damage may find that their lives, homes and jobs are seriously disrupted by the subsequent process of reconstruction. A disaster may be used as the pretext for firing excess personnel and political agitators who are an embarrassment to employers wanting to reorganize (Latin America, 27 Feb.'76). The economic survival of the small trader, artisan, or shopkeeper is sometimes overlooked in the surge of enthusiasm to rebuild along sleek, modern lines (Kates 77:264-70). The eviction of tenants to make way for newer development, or simply to relet at higher rents, is too, part of the social price paid for economic development in the wake of a disaster. There is little doubt that disasters are most inegalitarian in their effects.

1.3 EFFECTS ON THE GOVERNMENT SECTOR

The mobilization of the government machine to cope with a serious emergency may not be an easy matter. Aside from the fact that needed staff may be cut off from their place of duty by floods, landslides or other interruptions in communications, many may be uncertain about where their primary responsibilities lie. In a society where the family institution is dominant, many officials

will prefer to take care of their domestic responsibilities before reporting

for work (Haas and Ayre 69:57; IVSO 55; Kates et al 73:986-7; Killian 52;

McLuckie 70; Prince 20; Roth 70:447; Thompson and Hawkes 62). However, in

societies where the level of conscientiousness in public duty is high, families

and organizations have been known to release valued individuals for work in the

public interest. While the cultural factor is undeniably important in influ-

encing the dimensions of this problem, neither the level of responsibility of

the official nor his or her previous training appear to be indicators of likely

behavior in reporting for duty or not.

By rearranging priorities, calling in off-duty staff, and by working longer

hours or multiple shifts, official bodies can generally compensate for a temporary

loss of some staff, and even increase working capacity to cope with a crisis

(Dynes and Quarantelli 73:6-8; Leivesley 77:215). Indeed, a major problem may

well be an excess of officials and volunteers who are motivated to help but who

have nothing useful to do. Even the emergency services -- police, fire-fighters

and volunteer doctors -- may be so hyperactive in seeking ways to help, that

their efficiency can be less than normal (Barton 69:99).

Not all parts of the emergency system will suffer an excess of manpower over

needs. Key officials can find themselves overburdened by numerous calls on

their time and attention. Administrative systems which are highly centralized

are more likely to suffer problems in this direction than ones where decision-

making responsibilities are properly delegated. A compounding difficulty in

many countries is that there is no national organization or even government

department with direct responsibility for initiating, directing or coordinating

disaster-related activities. Governments with small administrative budgets rarely have a civil service of adequate size and discipline to continue to provide services when the physical or political government is undergoing upheaval. The need to provide additional services constitutes an added strain. When communications break down and directives are not received as usual, the actions of branches of the government become less predictable. If, in addition, there is uncertainty as to whether the government may be in power at all, administrative response to the disaster becomes extremely problematic (Kates et al 73:987).

The administrator's fear that he may be held accountable for emergency actions which later prove to be unnecessary will slow a government's response. At the same time, when under stress, there will be a tendency for the unprepared official to attempt to isolate himself from immediate events and to hold on to the definition of his role which has served in the past, even though this may no longer be appropriate to the disaster context. Confronted with an unusual demand for leadership, bombarded with ever pressing offers of assistance, and enquiries from representatives of the news media, the official may feel himself obliged to make important decisions while still operating in an environment of scarcity of fact and extreme uncertainty. Prolonged subjection to conflicting interpretations of need, and anxiety over one's proper authority, can produce emotional and organizational stress which is difficult to contain. In the absence of training or reliable guides from past experience, suggestibility is high. There is acute danger that in order to resolve the anxiety, the administrator alights on those policies which appear to provide "an answer" or "a plan." The way out lies in the pursuit of those policies which appear most

likely to extricate the administrator from the pressures to which he is subject (Kates et al 73:986; Kilpatrick 57:21; Mileti et al 75:109; Quarantelli and Dynes 67; Taylor 77:16). Hasty decisions generated by crisis pressures then, in turn, lead to further crisis by virtue of their inadequacies.

In the first few days of an emergency, personal, political, and interdepartmental differences will be submerged beneath a general desire to pull together for the benefit of the community as a whole. Very soon however, pre-existing conflicts and rivalries will re-emerge and may become serious obstacles to achieving an efficient, coordinated government response (Demerath and Wallace 57; Leivesley 77:215; Mileti et al 75:93). Problems of jurisdiction arise. The initial sharing of personnel between agencies, or the fact that early leaders may not have formal authority, will need to be normalized (Mileti et al 75:82-3). Mutual suspicions between the government and the voluntary aid sector, perhaps exacerbated by an insistence by one that it should have exclusive control of some function, is liable to hamper the effective delivery of relief. The dependency of voluntary organizations on a public recognition of their services can drive them into competitive behavior with one another, and with the government. Public agencies having some degree of independence may also act competitively. When it is realized that very soon choices must be made on the future of government services, and that departmental budgets must be revised, the competitive spirit takes on a new meaning. Similarly, an uncoordinated scramble for large amounts of foreign aid both inflames tempers and injures personal and departmental pride.

Apart from those obstacles to efficiency and effectiveness which beset government from within, there are likely to be at least three other major causes for concern which affect the performance of government administration.

The first relates to a common reaction to disaster which involves the spontaneous movement of large numbers of people and materials towards the zone of impact. Many people are drawn by curiosity to see what has happened; others to search for kin and friends; and many more are motivated by a strong but usually undirected desire to help. In large disasters this "convergence phenomenon" takes on international dimensions with the arrival by air of numerous foreigners and large volumes of material aid, much of which is of questionable utility. While these displays of solidarity between peoples are, in the broader sense, socially useful in that they bind communities together, in the management of the immediate crisis they are usually superfluous and quite often counterproductive to the effective organization of recovery (Davis et al 77; Fritz and Mathewson 57; Leivesley 77:214; Long 77; Wenger and Parr 69).

The second external obstacle to the government's job resides in the fact that when industry and commerce are interrupted, government agencies do not receive their normal tax revenues. Where damage is widespread and evacuation the norm, income from property taxes may disappear overnight. If employment is adversely affected, incomes will drop, spending patterns will be restricted, and sales tax revenues drop correspondingly.

The third problem is that this shortfall of tax revenue will bite at a time when there is need for increased public expenditure to make good the damage.

Streets and bridges must be opened, government buildings must be rehabilitated,
public utilities patched up or replaced, and government medical, welfare, and
feeding services expanded and/or re-equipped. For longer-term reconstruction,
the government administration will almost certainly need a greatly expanded
staff of experts and technicians. The compulsory purchase of private lands may
become necessary and compensation required. Every facet of improving the
quality and safety of the environment will cost money. Revision of the building
code; consultation between government departments, business interests, and the
people of the communities served; and additional public services will all need
to be financed out of public revenues. Government will be required to reset
its priorities in accordance with its actual and projected income (Haas et al
77:57-9; NRC 75:40). Clearly, it is the society with the most precarious budget
which will be least able to absorb the shortfall between current revenues and
the cost of a disaster.

1.4 DISRUPTION AND OPPORTUNITIES FOR CHANGE

Throughout history it has been observed that natural calamities have precipi-
tated important social and political changes. Old antagonisms between different
sections of the community are exacerbated (CIIR 74:13; Mohr 74:2) and weak spots
in a government's administration are exposed. Whether one interprets such
disruptions as a loss or gain depend on one's perspective, but the circumstances
by which such changes come about are of sociological interest.

Inasmuch as disasters disturb the constraints on daily life they enable individuals and organizations to perceive the fact that their lives need not always be organized according to established patterns. The possibility of introducing desired innovations, of removing old injustices, suddenly emerges. When the future is uncertain, a break with the past seems possible. Attempts to find new forms of organization to cope with new situations, especially in the early crisis period, encourage people to think that there is perhaps hope for some kind of social renovation on a wider scale. In isolated communities, an institution such as the church may serve as the focal point for revitalization (Davis 70:125). In the brief lull between crisis and reconstruction the utopian imagination is unbound. Yet unless this spirit can be channeled it will vaporize, leaving in its wake only a sense of frustration.

While those values and patterns of behavior which were present before a disaster generally continue to operate afterwards, a disaster does punctuate the life of a community with a memorable event. Past history, present suffering, and future hopes are fused together by an emotional involvement (Fritz 61:672,685, 691; Prince 20; Quarantelli and Dynes 72:69). Other events in the life of the community are then dated by reference to the memorable event.

Sudden, severe shocks to the fabric of life can be revealing. The social norms governing the allocation of goods and services are displayed in a new light. The inequities which go unnoticed at normal times are open to question. Contracts may go unfulfilled, authority challenged, and the control of property threatened. The institution of property normally allows owners the right to leave resources unused while denying their use to others. Where large numbers

of people lose their homes and have no alternative but to demand access to other land, then a trespass may result in the establishment of illegal squatter settlements (Abrams 64; Koenigsberger 76:65; Thompson and Hawkes 62:268-79).

Such changes need not be viewed entirely negatively. The combined presence of a community revitalization process and focus for the expression of collective hostility against outsiders can, in fact, be both the result of and the beginning of healthy community development. Indeed, the possibility of organizing together for the achievement of a community improvement may provide precisely the therapeutic conditions which enable the bereaved to work through their feelings of hostility, suspicion, and isolation from those who have not suffered directly from the disaster (Miller 73). Of course, the degree to which the power structure is able to be flexible in the face of such challenges will greatly influence the impact of the disaster on directions of social change (Sjoberg 62:360). In any event, it seems likely that collective stress situations play an important part in the collective learning process by which ideologies and values change (Barton 69:268).

Disasters often have a striking effect on the structure and virility of organizations in the non-governmental sector. The large volume of altruistic concern cannot always be channeled through existing institutions. Existing bodies may be inadequate in number, or simply unresponsive to the enthusiasm of people who want to help. Many new socially-concerned groups will therefore be established under their own leadership. Some will last only for the duration of the crisis but others acquire legitimation and funds which enable them to continue to render other forms of public service after the emergency has passed (Quarantelli 70; Taylor 74).

Not only may new organizations result from a disaster, but existing organizations sometimes experience profound changes as a result of the strains placed upon them. The need for some of these changes may predate the crisis, but heavier demands on agencies' services and the setting up of new services show up existing weaknesses. Sudden responsibility for the management of extraordinarily large sums of aid, in the form of money, materials and personnel, not infrequently causes non-governmental organizations to falter or be crushed under the pressure of external generosity (Mileti et al 75:136; Taylor 74 and 76).

It may in fact be impossible to distinguish between those social effects which are strictly attributable to the disaster and those which are the result of ongoing economic and social forces in the society. In those cases where disasters interfere in the course of history, the social changes resulting will probably involve no more than an acceleration of existing trends. The razing of cities by earthquake, fire, or aerial bombing, for example, has almost always speeded up pre-established economic trends. Sometimes, modernization processes have been shortened by decades (Bowden et al 77:144).

In more mundane ways, too, disaster can accelerate or retard processes of social change. The inundation and destruction of property that is nearly depreciated anyway may provide an incentive for redevelopment and changes in land use commensurate with current needs, resources, and technologies. Communities, even more than individuals, are reluctant to destroy property in order to obtain benefits from a change in land use, but experience suggests that following a flood, they may be prepared to accept some changes (Burton et al 68:23; Islam 74:24; Renshaw 61:38). Similarly, the advent of drought may in some cases

encourage innovation and the adoption of new economic ideas. Societies with low levels of involvement in the cash economy might, for example, be forced by necessity to participate more fully in the monetarized sector (Wisner and Mbithi 74:90). The movement of whole communities from inaccessible areas to the roads has also been noted (Caldwell 75:30).

A typhoon on the island of Ulithi in 1960 hastened permanent change in the dietary habits of the population. The existing trend towards the use of foreign foods was reinforced by a greater reliance on relief commodities. This change reflected itself also in purchasing habits; patterns of exchange; an accelerated trend towards a cash economy; a new role for women in relation to food production; an increase in land values; and a reduced preparedness to support the lazy or non-productive members of the community (Lessa 64).

Many of the long-term social changes which have occurred have generally been the result of adjustments to the economic impact of disaster. It has been suggested, for example, that in the United States, as floods accelerate the physical deterioration of a neighborhood, the social effect may sometimes be to drive the better-off residents from the flood plain and draw in those people who seek lower-priced property. Each flood accelerates the deterioration of the area into a slum neighborhood (Roder 61:76).

Certain changes in marriage customs among a refugee community in Cyprus were traced to a loss of homes and property. It was no longer reasonable to expect a young man to have property or a girl to delay marriage until a home could be provided. Parental control over courtship behavior was also weakened. The

dispersal of the previously compact community liberated the young from the
watchful eyes of village gossips. The bonds of social control in general were
weakened as impermanence and the need for improvisation allowed for new ways.
It is interesting to note that, in this case, a further result was a predicted
rise in the birth rate (Loizos 77:235).

Whether any of these, or similar changes are to be evaluated positively or nega-
tirely depends partly on one's idea of the good society and partly on one's
time perspective. A given set of events may be seen as catastrophic at the time
yet judged years later to have made a positive contribution to the society's
advance (Sjoberg 62:358). A planner reporting on the reconstruction in Turkey,
for example, commented that "The only people to lose in the Skopje earthquake
were the dead or wounded. For everyone else it has been the greatest boost,
both to the city and the entire regional economy" (Davis 75:662). This
amplified rebound effect, in which a society is carried beyond its pre-existing
levels of integration, productivity, and capacity for growth, is a phenomenon
which has been observed in many devastated urban societies (Fritz 61:692).
Whether the resulting society is a "better" one depends, again, on what one
believes development should be.

1.5 SOCIAL FACTORS WHICH EXACERBATE THE IMPACT OF A DISASTER: DIFFERENCES BETWEEN COMMUNITIES

The term "natural disaster" implies that the primary cause of a catastrophe is some natural phenomenon. While it is true that drought can lead to famine, that earthquakes can lead to people being killed, and that floods can result in people being drowned, this need not necessarily be the outcome (Ball 75: 368). An extreme climatic or geological event in a part of the world where there are no people does not result in a disaster. To experience a disaster, people have to be located in a place which is vulnerable to the elements. In effect, disasters mark the interface between extreme physical events and a vulnerable human population (O'Keefe et al 76:566; Westgate and O'Keefe 76:61).

The answers to why people are located in those vulnerable places, and how they are or are not protected from the ravages of the environment, lie in various combinations of economic, historical, social, environmental and political factors. Some societies are situated in more exposed positions than others but it is also clear that some societies are less well protected than others or have more vulnerable concentrations of resources. Within societies too, some people are better protected than others. It is for these reasons that one may hope to curb the ravages of "natural" disasters. We cannot yet control either the climate or geological forces, but man's part in setting the stage for catastrophe can be substantially rewritten.

Each disaster is different from all other disasters. The time, place, magnitude, causal agent, speed of onset, duration, range, and the degree of

preparedness will be different in each case (Barton 69:41). Also, there is no average community and no average person. Many factors influence the degree to which any one individual succumbs to environmental hazard and these vary widely within a very small area. Whether, and how, effects show themselves will depend very much on the mix of factors which relate both to the causal agent and to the society itself. What then are the factors which increase the impact of disasters on some communities rather than others?

It is tempting to begin with a notion of man in perfect harmony with nature and then to attempt to adjust those imbalances which tend to make him more vulnerable. However, apart from the inconvenient fact that a perfectly stable ecological balance between man and nature has probably never existed, there are a very large number of factors which interrelate to produce any given level of vulnerability. Rarely is any one of these factors likely to be the single key to achieving a reduction in vulnerability.

For example, while excessive population growth in relation to absolute resources and their relative distribution is a very important factor affecting a nation's propensity to disaster, it is rarely possible to manipulate this factor alone. What is an optimum rate of growth for a given population? The optimum can be set at widely varying levels depending on the standard of living one is prepared to accept. It will vary with the level of development and in accordance with the basis of a country's economy. Even if one can agree on acceptable levels of population, it is next to impossible to engineer demographic variables so as to achieve and maintain the hypothetical optimum. The question of time also enters the picture. Because under existing land use arrangements, levels

of technology and socio-political conditions, there is pressure on land and increasing concentration in the urban areas, it does not follow that this will always be the case. Attempting to ensure that a society has a large enough gross product per capita so that it can protect itself against natural hazards, may be as much a matter of inducing changes in the agricultural economy and the creation of employment opportunities as it is of population control per se. Indeed, the question regarding "overpopulation" runs into conceptual difficulties which make the term of questionable utility (Hance 75:131; Hankins 74: 104; Mbithi and Wisner 73).

The fact remains that disaster risk has increased for a large portion of the world's population. The increased risk can be brought about by forces which impinge on the individual's usual habitat, or they may be experienced as a result of moving into a new area. The dangers from migration involve the rich country urbanite seeking a country residence (Burton et al 78:13) as well as the poor country peasant who seeks land to farm (Wisner and Mbithi 74:91).

The imbalance between the distribution of population and the distribution of resources has been responsible in many parts of the world for the destruction of aspects of the environment having a direct bearing on man's vulnerability to nature. The deforestation of vast areas by commercial interests and peasants has, for example, resulted in the erosion of soils and increased the potential for destructive flooding. The expansion and intensification of land use in marginally dry lands during wet years has caused progressive desertification and increased the risk of famine (Eckholm 76; UNEP 77:1; Shepherd 75:10).

Ironically, efforts to improve one aspect of life in a delicate environment can result in even greater problems in another sphere. The sinking of boreholes in the Sahel region of Africa, for example, though intended to relieve drought, resulted in nomads keeping their herds by the boreholes instead of migrating to other waterholes. Overgrazing and trampling destroyed the vegetation and resulted in unanticipated erosion (Ball 76:52; Glantz 76:13). The schooling of children from nomadic tribes has kept them away from the tribe and prevented them from learning traditional strategies for coping with disaster (Dalby and Church 73). Unwise investment programs and a desire to regulate the movement of animals for taxation purposes has also contributed to processes of desertification (Ball 76:521; Meillassoux 74; Swift n.d.). The superimposition of foreign technologies or government requirements on subsistence economies, which leaves little excess to protect the individual, or which holds little incentive for him to invest, has led to overexploitation of the land and has probably resulted in greater vulnerability than before (Shepherd 75:10; Westgate and O'Keefe 76:28).

There are usually good economic reasons why a community settles and remains in a hazardous place (Burton et al 68:23; Islam 74:23; Kates et al 73:982; Ramachandran and Thakur 74:38). That the soil is particularly fertile, especially in floodplains or on the slopes of volcanoes; that the ground is flat, making building easier; or that the community has easy access to communications routes or to water are all positive reasons for settling an area. Often, the same factors which make life easier at normal times are also responsible for the hazard. Negative reasons for moving into a hazardous area include the difficulty of surviving in previous locations because of the unavailability

of land, the ecological degradation of the environment, or the all-pervasive problems of rural poverty. In most cases, once installed, it is extremely difficult for an individual or community to move out of a hazardous region. To do so would probably involve substantial loss of an investment or a livelihood. Even if people feel threatened and would prefer to move from a hazardous zone, a dependency on their employers who make the locational decisions (Haas et al 77:30), a lack of employment prospects elsewhere (Islam 74:23), and the institutional and financial interests of others, operate to keep them in the same place (Burton et al 68:23).

From the point of view of creating, perpetuating and extending vulnerability to hazard in poorer countries, one of the most troublesome features is a heavy reliance on cash crop cultivation. The mechanism by which the community is made more vulnerable by such an economy may work in one or all of several ways. First, replacement of a subsistence economy by more commercially oriented agriculture, with a greater reliance on one crop, and the employment of crop segregation instead of interplanting, may in fact result in greater efficiency and higher income for those who can afford the capital investment. But the new technologies also increase vulnerability to drought and pests. Traditional farming practices evolved through long periods of trial and error in man's constant search for the best combination of techniques which reduced risk. The new shift to techniques which maximize profit are not consistent with the old objectives (Burton et al 78:43; Comité Information Sahel 74).

Second, the promotion of commercial cultivation, and the relative disinterest of government authorities in supporting subsistence agriculture, has caused peasants to over-exploit the land in an attempt to maintain both types of production. Retrogressive taxation policies have also been known to encourage speculation at the expense of farmers' reserves. Therefore, while an increasing proportion of the land is devoted to the raising of cash crops or animals for sale, a decreasing amount remains for the farmer to feed his own family (Baird et al 75:33). Third, the peasant then finds that market conditions, or other needed services such as transport, and not his own land and labor, determine his income. Under this system, the margin of reserves which he would use to resist a disaster is determined by the vagaries of the market price for his products (Meillassoux 74). Fourth therefore, having grown less to feed his own family, the small farmer is obliged to buy food in the marketplace. This makes him additionally vulnerable to fluctuations in the supply and/or price of foodstuffs, over which he has little control (Ball 75:369 and 76:520-1; Wisner and Mbithi 74:93).

The fifth circumstance leading to greater vulnerability among the population of a country dependent on an export crop economy, is that the better land is often given over to the larger commercial interests which manage that type of cultivation. As such enterprises expand, the peasant cultivator is pushed into more marginal areas. The invasion of these more delicate environments leads to rapid degradation of the ecosystem, to erosion, and ultimately to hazardous landslides (Baird et al 75:31), or to accelerated desertification and increased exposure to the ravages of drought and famine.

The level and quality of community organization, and of government, are other important factors determining the impact of a disaster on a society. Where few of the populace are knowledgeable in public affairs and where there are few opportunities for training in leadership roles, there will be correspondingly fewer people available to manage a crisis. Where officials are recruited to positions of public responsibility by kinship, friendship or favor, then the standard of leadership and the technical competence of government are likely to be much lower than in those cases where they are recruited on the basis of election, or by open competitive examination. Indeed, a disaster situation is likely to show up the weaknesses of such an ascriptive system of recruitment, as no other test can (Barton 69:157; Clifford 56:23; IVSO 55).

However, bureaucratic adherence to formal regulations does not always produce the best response to disaster. Where the animus of civic administration is to do as little as necessary to keep people satisfied, and to keep one's job, then the public welfare is unlikely to prosper. Where officials see the granting of benefits to others as constituting a threat to their domain; where there are no effective controls by the people over the whims of the officials; and where there is no trust in political parties or government; then there will be no leaders and no followers. Coordinated action of any kind will be impossible (Banfield 58; Barton 69:291). Governments dominated by business interests are not likely to be very responsive to community need, unless that corresponds closely with what is good for business (Barton 69:290; Dynes and Wenger 71; Mileti et al 75:32). Realtors and civic leaders may suppress discussion of hazards; refuse to recognize publicly the dangers of encroaching development

for which they are privately responsible; and sometimes reject flood protection
or other works in order to avoid admission of the existence of a hazard (White
et al 58).

There are a number of other unfortunate social practices which tend to exacer-
bate problems associated with disaster. Hoarding and profiteering are perhaps
the most widespread, especially in times of famine (Bhatia 67; Wiseberg 76).
Speculators may take advantage of grief-stricken victims by purchasing their
remaining worldly possessions, relief goods, or farm animals for needed cash,
but at a fraction of their fair market value (Haas and Ayre 69:58). Relief
supplies not uncommonly find their way onto a black market.

Some social practices which are designed to protect man from nature can be
extremely paradoxical in their effects. The practice in pastoral societies of
the Sahel of storing wealth in herds of animals, is one such double-edged sword.
While large herds protect the peasants from an insecure existence in the face
of drought, the same animals destroy vegetation and soil, and increase long-
term vulnerability (Wisner 76:26). In the same region, there is a limit to the
protection which a farmer can afford himself by storing food. The larger his
store, the greater is the pressure to share out the food with friends and
relatives (Caldwell 75:57-8).

Social customs apparently unrelated to economic necessity may also affect
vulnerability. It has been reported, for example, that societies observing
purdah may be unwilling to evacuate in the face of a tropical cyclone if this
means subjecting women to public exposure (Burton et al 78:5). In general,

the stronger the caste divisions within a society, the less it is able to cope
with unexpected situations which require a pooling of resources. Hospitals in
countries practicing racial discrimination have been known to refuse admission
to Negro disaster victims (Barton 62:246).

Existing prejudices and beliefs may prove to be particularly fatal at times of
stress. Denying protein or certain fruits to the sick in the belief that those
foods are inappropriate to the victim's condition may unnecessarily reduce the
chances of survival. Similarly, watering down "formula" baby food in the
mistaken belief that diarrhoea contraindicates regular feeding, will accelerate
the baby's decline. Mistakes, too, drive up fatality rates. During extended
famines, people have been known to consume any available plants or animals,
and poisoning from eating wild plants is common (Brooks 71).

1.6 SOCIAL FACTORS WHICH EXACERBATE THE IMPACT OF A DISASTER:
DIFFERENCES BETWEEN INDIVIDUALS

On examining the socio-economic makeup of that part of a population affected by
disaster, one finds that it is generally those with the lowest incomes and
lowest social status who suffer most. However, this is not always true in all
respects. In Managua, Nicaragua, only 26 percent of the low-income housing
was destroyed in the earthquake of 1972, compared to a 60 percent loss of
housing for the lower-middle-income group and a 84 percent loss of housing for
the middle- and upper-income groups (Bowden et al 77:137; Kates et al 73:985).
In Guatemala's earthquake of 1976, while the rural and urban poor who lived

in houses of mud block lost conspicuously more than did the wealthier members
of the community who lived in houses of reinforced concrete, the very poorest
rural dwellers who had houses of wood and straw escaped the earthquake relatively
unharmed (Rosene 77; Taylor 76a). Similarly, a study of the effects of a
drought on a community in India revealed that, while the small farmers fared
worse than did the village as a whole, large cultivators lost a greater propor-
tion of their assets than did those who had relatively little to lose (Borlar
and Hadkarni 75:39). Nevertheless, while being mindful of these anomalies, it
is helpful to identify the different ways in which low socio-economic status
generally increases the impact of disaster.

While a flood or drought can ruin a farmer, in relation to certain other catas-
trophes, those who depend on the land for a living may be better off than those
who depend on industry. In general, vulnerability varies with the nature of
the relationship between the individual and his means of production. An urban
wage earner is highly dependent on the uninterrupted continuance of his industry
and, in the case of an earthquake for example, may be thrown out of work without
means of subsistence. At the very least, with a rise in unemployment, the
demand for minimum wage levels can be expected to fall (Baird et al 75:32).
The rural farmer who owns his means of production will, on the other hand, be
better equipped to determine his own fate. Similarly, a peasant who rents land
or who depends on agricultural credit is more vulnerable than one who does not.
Without reserves of wealth, there will be no margin to cover lean years or
sudden loss, and a family will find it difficult to rehouse itself or reestab-
lish productive activities after the event. Clearly, people who are very
vulnerable to disasters become more vulnerable as their absorptive capacity

is eroded with each successive disruption (Westgate and O'Keefe 76:63). Again in the urban sector, it has been found that higher occupational categories will be assured of a greater continuity of employment in times of crisis than those whose occupational skills are more dispensable (Trainer et al 77:197).

The level of real cash income available to a family is a prime determinant of vulnerability. Cash income reflects itself in the family's pattern of consumption. Without an adequate and regular income, a poor diet will lower resistance and slow recovery. Death seldom results from malnutrition alone, but because lower-income groups do not usually benefit as well from preventive medicine as does the population as a whole (Dynes 70:67), susceptibility to endemic and epidemic diseases will ensure higher mortality and morbidity rates among this group (O'Keefe 75:21; Wisner and Mbithi 74:93-6). Problems of indebtedness among the rural poor, and the inadequate capitalization of subsistence agriculture -- which shows itself especially in the lack of credit and crop storage facilities -- oblige many small farmers to sell their food production at harvest time and buy it back for consumption at elevated prices. Insufficient and/or poor quality land is also a factor which seriously limits income, and therefore increases vulnerability among rural populations in many parts of the world.

Those in the lower income brackets have more dilapidated housing and therefore are generally more subject to the ravages of wind, water, or shaking of the earth. In some countries, mobile homes are a common refuge for those with insufficient resources to compete in the housing market. A disproportionate number of the poor, the elderly, and members of ethnic and other minority

groups reside in vulnerable housing (Dynes 70:67; NRC 75:96; Trainer et al 77:168; White and Haas 75:77). These groups, many on fixed incomes and with limited savings, also find it more difficult to recover from the setback which a disaster brings.

The recovery of a family is influenced directly by the nature and severity of the impact which it sustains. Death, serious injury, or emotional disturbance will alter patterns of family interaction and will make recovery difficult. The loss of the home may be particularly hard on those for whom it represents a lifetime's investment. Families which move as a result of a disaster bear relatively greater loss than those who stay put. The move may be induced by heavy losses, but it will also imply additional costs and sacrifices (Dynes 70:67). If employers close down or move to a new location, this too will have a serious impact on family income and/or on the time and money required for traveling to work. The distribution and accessibility of one's friends, usual shopping stores, place of worship, local school and community center, may all suffer (Haas et al 77:30; Trainer et al 77:181). In urban areas, the intensity of emotional reaction to these types of loss will probably vary according to the social class of the victim. The view of one's "home" as encompassing the neighborhood is a characteristic of working-class people who enjoy limited spatial horizons (Fried 63:154; Loza-Soliman 73:249-50). The proportion of residents knowing other places to earn a living is likely to be higher in the upper socio-economic class and lower in the lower classes. The more advan- taged group is likely to regard earning a living elsewhere as more feasible (Islam 74:22). For all, the increased practical problems of living can be magnified by a feeling of having been denied the opportunity to participate

in the decision-making for rebuilding. The neglect of community services which
one has come to expect may also be a cause for resentment and unhappiness
(Taylor et al 76:277).

It is the young, the old, the infirm and the isolated who are likely to bear the
greatest loss. In the Bangladesh cyclone of 1970, age-specific death rates
showed a bimodal distribution: 29 percent and 20 percent in the 0-4 and over-70
age groups respectively, compared with a death rate of 6 percent in the 35-39
age group (LeChat 76:424). Older people are more likely to become physical
casualties (Friedsam 61 and 62) and are less able to cope physically with emer-
gency needs. They may also have difficulty in understanding the procedures
required by insurance companies (Leivesley 77:209) and other relief agencies.
Foreigners, non-literate people, and other isolated groups will suffer a similar
handicap. The general disruption of life will be especially acute for the
elderly, the sick, pregnant and lactating women and, in the case of famine,
their children (Jelliffe and Jelliffe 77:199), and for those with young children
needing constant attention.

Relatives and friends normally supply assistance in times of crisis, but for
the old, the insane, widows, and the socially isolated, such help may not be
available (Caldwell 75:53; Haas et al 77:33; Mbithi and Wisner 72:39). Those
who have migrated to the cities and, for reasons of distance or other motive,
neglected to maintain relationships with their rural kin, may find themselves
without the traditional supportive ties. Those to whom the help of relatives
and friends is available are, almost by definition, socially richer. It is
usually only the poorest who will resort to official sources of assistance
(Mileti et al 75:70; Moore et al 63:124).

Faced with a disaster or the threat of a disaster, there are a number of things which an individual can do to lessen the impact on himself and his family (Berry et al 71; Burton et al 78). Among the options available, migration from the area to seek paid employment, or relief from government (O'Keefe 75:22) or relatives, often provides a short-term solution. Labor migration is common in many parts of the world. It brings benefits in providing a supplementary (or even the primary) income to people who find it difficult to eke out an existence from their own environment. On the other hand, such migration disturbs family life and drains the affected areas of labor which might otherwise contribute to the development of the homeland. In almost all cases therefore, labor migration exacerbates existing regional inequalities (Wisner and Mbithi 74:94-6). Repeated disasters or a combination of different disasters (Berry et al 71; Mbithi and Wisner 72:6) drives more and more people to seek temporary jobs elsewhere or to move permanently to a new home. Many of these will gravitate towards the already overcrowded urban areas where they have kinsmen or relatives who will take them in (Caldwell 75:29).

Not only may this accelerated rural-urban migration wipe out any advances made in improving urban conditions (Barton 69:17), but the migrants may well be escaping from one set of hazards only to expose themselves to others. In the push to find accommodation, new arrivals settle on tracts of land suffering from defects which prevent their normal use. Low-lying sites or coastal locations that are subject to flooding, and steep hillsides which are subject to landslips are often the only resort for the urban migrant. Dense occupancy ratios, the unregulated use of combustible materials, and the lack of a water supply mean that these settlements are also vulnerable to massive conflagration.

Disastrous chain reactions -- fire after earthquake or flood (caused by attempts to dry out the structures) are not uncommon. Excessive concentrations of people in the absence of a protective infrastructure and an adequate job market, means that the poverty of the environment compounds the poverty caused by unemployment.

Even those who migrate to other rural areas may lay themselves open to violent hazards. In Bangladesh, the potential deaths from cyclonic storms is intensified by the influx of migrant agricultural laborers for the sowing and harvesting of rice -- at times which coincide with the cyclone seasons. Their accommodation in temporary huts near their work but away from the village means that they suffer most from the lack of communication and timely warning (Islam 74:23-4).

Only in a few cases are migrants able to reach their destination speedily and with a minimum of hardship (Britannica 74:576). Often they must live under the most trying circumstances, and where great crisis sparks a mass migration, the movement is not infrequently accompanied by epidemic diseases (Brooks 71). Thus, disasters can be both causes and effects of migratory movements.

Chapter Two

SOCIAL ASPECTS OF PRE-DISASTER PLANNING

Disaster prevention can be described as action designed to prevent natural phenomena from resulting in disaster. This will include the development of long-range policies for the scientific study of natural phenomena, leading to prediction of their probability, the organization of warning systems, and the education and training of the population in preventive action. Disaster prevention also includes planning and legislative measures, such as land use and zoning based on vulnerability analysis; the enactment of building codes; and the use of proper structural standards and building materials.

This chapter assembles a number of observations from the social sciences and fuses them with some policy recommendations for disaster prevention and mitigation. Many of these have particular relevance to developing countries. After reviewing the advantages and constraints on preventive planning in general, the following specialist areas will be covered in varying detail: forecasting and warning; zoning legislation and building codes; disaster insurance; decision-making; education and public information; and obtaining public participation in disaster-related programs.

2.1 PREVENTION PLANNING

There is usually a wide range of alternative and complementary measures which
can be taken either to prevent a disaster or to mitigate its effects. Planning
for disaster prevention involves the careful selection of those strategies
which will combine, in the most effective way possible, action by the individual,
the community, and the nation as a whole. A government can pursue its own
course for the reduction of vulnerability by employing the means which only
governments can command. In this category, dam construction, water resources
development and coastal protection works are likely candidates for direct
action. Second, the government can guide the choices made by individual
citizens, either by legislation or by education and the provision of informa-
tion. Third, a government can offer services which make it easier for individ-
uals and/or the local community to adopt their own measures. Disaster insurance
and grants-in-aid are examples of this type of hazard reduction policy (Burton
et al 78:113).

What are the advantages of having a national plan for disaster prevention?
First, by including in a national catalogue of official concerns a recognition
of the importance of disasters, a government draws attention to the problem
and provides a policy framework within which to address it. Second, by spelling
out the relationship between disasters and development, the government is able
to show how the advances proposed in other sections of the plan will be safe-
guarded from unexpected setbacks. Third, by setting up goals and objectives,
over time it should be possible to learn whether actions are cost-effective

or, indeed, whether they do any good at all. In the relatively new field of
disaster prevention, this facility for learning from experience is essential.
Finally, the plan will indicate to what extent the government values different
social and economic objectives. National economic efficiency; the enhancement
of health; the avoidance of social disruption; the protection of the environ-
ment; and the equitable distribution of loss and/or benefits are all possible
goals towards which a national disaster prevention plan can be oriented (White
and Haas 75:118).

Obtaining growth in the national economy does not, of course, necessarily
equate with an increase in the quality of life or with a future free of shor-
tages and misery. However, a plan which takes an integrated approach to the
reduction of both poverty and disaster vulnerability may enhance payoffs in
both directions. In any event, a commitment to the reduction of risk will
necessarily bear a resemblance to other redistributive policies aimed at
enhancing social welfare.

Answers to some basic questions will help in determining government policy.
Which geographical areas, which sectors of the economy, and which members of
the population are most vulnerable? Of these, which will receive priority
in prevention, relief and reconstruction? Which individual precautions are
or are not worthwhile? What combination of alternative precautions will be
best suited to the country's needs and budget? How much is to be spent
annually on disaster-related activities, and how will this vary in the future?
Who will bear the costs of prevention: the individual or community benefitting,
or the wider society? How, indeed, will the budget be provided at all, and

how will effects on the balance of payments be handled? How far to diminish the potential risk, and for what kind of additional cost, is one of the most fundamental questions asked of decision-makers. Another involves the balancing of policies for urban and rural development. Although the urban problems are often more conspicuous, the wealth and potential wealth of most of the developing countries comes from the land. While it therefore may make economic sense to focus attention on the rural areas, urban political pressures can be difficult to contain (Burton et al 78:207; Gane 74:10; O'Keefe and Westgate 77:29).

An important choice for any government will be the mix of technological and human solutions to vulnerability which it prefers to encourage. While the people of materially poorer countries have been obliged to adopt low-cost human adjustments to nature, those societies with greater wealth have relied heavily on high-technology solutions to protect themselves against hazard. There are many reasons for this, economic and social. Among the social factors, there is often strong pressure for technological solutions because they involve a shift of the costs away from vociferously objecting individuals to the society at large. Another reason is that there prevails a strong belief in some professional circles that technology is more dependable than any kind of "social engineering". It seems easier to calculate the amount of effort required to build a dam than to organize evacuation procedures (Burton et al 68:13,20). However, there is no evidence that benefits obtained from engineering works equal their cost of construction. On the contrary, recent investigations have suggested that too much technological manipulation of the environment produces new hazards while ameliorating the old. Numerous small losses are eliminated,

but at the price of sustaining greater losses in the long term. This happens
when protective works are overcome by the very rare event, or when other aspects
of the human use and ecosystems suffer as a result of controlling one aspect.

Two further possible effects of relying heavily on highly technological solutions
are that, as complacency sets in, speculative use of the seemingly safe area is
permitted, and preparations to cope with an emergency are relaxed. In places
where population or investment density is high, engineering works may be the
more justifiable alternative. Certainly, land use regulations will be difficult
to apply. It is not therefore that technological solutions are not required,
but that they should be applied only after careful consideration of other alter-
native measures which are perhaps less costly and/or more appropriate to the
society in question. Rarely is a systematic search made for all the possible
options. The best solutions will be found only by giving due consideration to
the whole range of technological and human use combinations, and selecting the
combination of actions which, while workable, will do least harm in obtaining
the desired good (Burton et al 68:5,11,13-15; Burton et al 78:173-4; Renshaw
61:22; UNEP 77:8).

Deciding on the amount and type of protection to be provided is primarily a
matter of balancing the costs of preventing a disaster against the possible
costs of not preventing it. Costs can never be eliminated, they can only be
minimized by choosing to incur them before the event (in prevention and miti-
gation) or afterwards (in relief and reconstruction). Two important factors
influencing the mix of adjustments to hazard are the speed of onset of the
possible disaster, and its possible magnitude. Given the uncontrollable

nature of volcanic eruptions for example, permanent protective measures would necessarily involve changes in land use, while short-term benefits could be obtained from a warning system (Murton and Shimabukuro 74:157). Earthquakes, though for the time being similarly uncontrollable, generally affect a wide area and strike suddenly. Bringing about changes in land use would be correspondingly expensive. The most feasible adjustment to earthquake razard is therefore to concentrate on the building of safe structures, and limiting secondary effects such as landslips, fires and tidal waves (Burton et al 68:12; Kates et al 73:982). Even these measures may be considered economically unfeasible. In at least one country where this consideration reigns, the development of a reliable method for earthquake prediction and an efficient warning system has been implemented as an alternative strategy (Yu and Haussmann 77).

Evidently, the amount one would want to spend on preventing loss will not be greater than the potential loss itself. However, in trying to attach prices to alternative courses of action, some awkward questions arise. How much will be expended to prevent the loss of life? Implicit judgments on this question are already contained in existing policies, but difficulty may be encountered in making the choices explicit. Similarly: What price will be put on the avoidance of social disruption? For most people, attachment to a place, especially a native place, is extremely strong. Land usually has a social and sentimental value to its owner greater than its simple market value. Attempting to put realistic prices on the evacuation of an area may therefore prove to be a task as impossible as getting everyone to comply with the evacuation itself.

As the use of resources in hazardous areas almost always produces some benefits, it will be necessary to add these to the equation before decisions are made. For example, the control of river flooding may negate benefits from the deposit of rich aluvium on a floodplain used for agriculture. Balancing out the loss of such assets in one area with the prevention of losses in another requires careful study of the river system as a whole, and man's activities in relation to it.

Although it may be difficult to calculate returns on the existing uses of land in hazardous areas, and even to calculate the final cost of bringing about a change in use, more problematic is the assessment of benefits and costs for the society as a whole. What time period should be used? A gain of one type to one community at one time period may represent a loss of another type to another community in another time period. Value choices are called for which may be difficult to handle in public debate. The development of policy involves a complex interaction of scientific knowledge, technical information, and some highly subjective judgments about social ends. Neither scientists nor politicians alone are likely to arrive at viable policies without the others' assistance, and without some mechanism for voicing the opinions of those who lives are directly affected by the measures under discussion.

The intelligent apportionment of administrative responsibility can make the difference between an effective government policy and one which dies on the page. Experience suggests that in disaster prevention, only comprehensive measures will be effective (UNDRO 76:17). It would seem preferable, therefore, to appoint a single authority to oversee implementation. Whether this be a

function allocated to a new body, or to existing offices, depends in part on
the variety of disaster to be contended with. The range of possible counter-
measures and the degree of competence of the existing ministries and depart-
ments will also have to be taken into account. When operational responsibility
is divided between various existing authorities, then a coordinating body for
prevention, with power to allocate additional funds or to direct the use of
existing funds, will be indispensable. As most national disasters are regional
rather than local or national in scope, the relationship between the national
and regional administrations will also need to be clearly defined.

There are a number of obstacles which can get in the way of effective planning.
The illusion of invulnerability is one of them. The infrequency of some
disasters and/or their usually mild effects makes it difficult for politicians
and administration to take preventive measures seriously. This tendency is
compounded when partial solutions are adopted in the mistaken belief that they
provide the whole answer. Even when government is sparked into action by a
calamitous event, the problem too often disappears from the political conscious-
ness as soon as a crisis appears to have passed. The prevention of disaster
requires, however, long-term planning and thoughtful implementation. This
requirement is often incompatible with the short time horizons with which
politicians and elected governments customarily operate.

Other administrative obstacles are worth noting. Effective planning rests
on a shared understanding of where the locus of responsibility lies. If there
is disagreement between powerful actors and competition over who will collect
the prestige attached to a new program, little planning will be possible.

An added danger is that as the proponents of ongoing programs become threatened by the potential loss of funds to disaster prevention, conflicts will develop between the respective administrative units. The size of the government bureaucracy may also be a problem. As government ministries and development agencies evolve to handle ever larger programs, their ability to address themselves to small initiatives appears to diminish. Small projects, or modifications in projects, which could have a high payoff in terms of reducing disaster vulnerability, tend to slip through the bureaucratic machine. Finally, without adequate provision for the regular maintenance of preventive measures, no amount of planning or initial expenditure will confer the desired protection. Flood levees may weaken or erode, irrigation canals become silted, and warning systems atrophy from lack of use. Unless an annual budget can be guaranteed for the maintenance of services, it may be wasteful to begin at all.

2.2 FORECASTING AND WARNING

The distinction between forecasting and warning should be made clear. A forecast is a statement issued by an appropriate and technically qualified body that a natural phenomenon will probably occur in a particular area during a particular time period. A forecast provides information based on scientifically observable facts. It says nothing about what people should do in response to it. A warning, on the other hand, is a public message to the effect that steps should be taken in preparation for the event. Warnings are issued by government officials who are presumed to be acting in the public interest. Warnings are based on forecasts, but not all forecasts will be followed by warnings

(NRC 75:8). Some instantaneous types of disaster such as explosions or earth-quakes, permit of no warning at all. Others, such as tornadoes or flash floods, permit of very brief warning; while tropical storms may allow many hours or days of advance notice. A famine warning system incorporating nutritional surveillance and the monitoring of food stocks can give weeks' or months' warning of a crisis.

The usefulness of warning systems in saving lives cannot be denied. In the United States of America, the graph of deaths due to hurricanes has steadily declined since the beginning of the century as warning systems have become more efficient. Property losses may be mitigated too, as sufficient warning allows people to tie down movable objects against wind or to remove their possessions from flood waters (Gane 75:14). The hurricane warning service for U.S. and the Caribbean area is said to have averted losses of approximately $25 million in an average hurricane season and up to $100 million in a very active year (Mileti et al 75:29).

In spite of the evident benefits, there are a large number of difficulties which may be encountered in establishing an efficient and effective warning system. Foremost among these is the difficulty of obtaining the desired response from the population. People are not machines and do not respond automatically to a given message. In deciding whether to take a warning seriously, people apply the new information to their past experience and to what they can detect with their own senses. It is therefore difficult to warn successfully against an impending danger when there is little or no recent disaster experience in the community. Many people tend to deny or disbelieve information that

danger is near. In the absence of experience, quite obvious signs of approaching danger are ignored or mistakenly attributed to harmless, familiar causes. People seize on any vagueness, ambiguity or inconsistenty in the warning message which will enable them to interpret the situation optimistically. Unless there is complete confidence in the source providing the warning, or people can directly perceive the signs of danger, they are likely to search for additional information before taking any action. As warnings do not normally specify with any prevision where a disorder will occur, when it will occur and, indeed, with what degree of certainty it will occur at all, many people will want to find out how serious the threat is in their location and how long it will be before the onset can be expected. Family members, neighbors, co-workers, respected community leaders and public authorities will be contacted for supportive information and advice. Observation of what other people are doing -- running away or staying put -- is likely to prove a very strong influence in encouraging people to take the warning seriously, or not, as the case may be.

There are a number of other factors which will influence action. How long will it be before one has to decide? What are the measures available for survival? What will be the cost of taking protective action? How effective are the recommended countermeasures likely to be? What are the chances of escaping injury even if one stays put? Whether one is separated from, or close to, loved ones; whether there is a chance to get to them before the danger strikes; or whether one would be separated from them if avoidance action were taken, are also important questions. Some of these factors are interrelated: if the strength of the threat is great enough, the cost is given less weight; if the chances of salvation appear slight, the apparent utility of countermeasures diminishes.

Actions will be based on the worst previous disaster that can be remembered.
This action will be valid provided that the new situation does not surpass
the remembered ones.

Cultural factors influence the meaning which different people will attribute
to a warning. Each society defines an emergency in a slightly different way,
and people will react to a threat on the basis of their cultural traditions.
In a society where monumental decisions are made only on the advice of family
or village elders, the government's word of an impending disaster will be only
one source of advice among several. In a society which believes that man can
himself do little to alter the course of events, except through religious or
magical practices, then these will constitute the only preventive action.
On the other hand, a society which experiences disaster frequently can be
expected to develop a set of attitudes and behavior which enable it to respond
in appropriate ways. Such a society is said to have a disaster culture. The
condition of hypersensitivity to warning signs which is exhibited by a commu-
nity having recently experienced a catastrophe, can be viewed as yet another
type of learned response (Burton et al 78:106; Drabek 69:342-3; Dynes 70:59,72-4;
Fritz 61:664-71; Mileti et al 75:43-54,109; NRC 75:100; Williams 64:81,92-7).

In some North American societies, it has been noticed that there is a tendency
for persons of low and high educational levels to disregard the formal meaning
of a warning, while persons of middle socio-economic status more readily accept
the warning as valid. People belonging to large, authoritarian organizations
are more likely to act on an official warning than those who do not. Women
have also been said to interpret a signal as valid more readily than do men

in the same society. Those who are with members of their peer group when warning is given are least likely to take adaptive action, while those who are with their family are most likely to react positively. Older individuals and residents of small, relatively isolated societies are also said to be less likely to take a warning seriously than do the relatively more cosmopolitan urbanites (Mack and Baker 61; Mileti et al 75:47-9; Moore et al 63).

An effective disaster warning system requires a realistic assessment of these varied social and personal responses to information about danger. The problem must be viewed as a total process of communication and organization. It will be no use simply issuing information if no one listens, or if everyone listens but interprets the meaning in his or her own way. To be effective, a warning system has to inform about the danger, tell people what to do about the danger, and supervise actions so that the safety instructions are followed. At the very least, the warning authority will need some feedback on the way the population is responding. If people are not responding or responding in dysfunctional ways, then corrective measures can be taken by improving the message and/or by using other channels of communication.

The quality and timing of the messages issued by a warning official will be much influenced by the confidence which he has in the scientific information being received, and in his own authority to act. A forecast of a disaster-producing event may well come incrementally. When a possibility becomes a probability, and when a probability becomes a certainty, will not always be easily distinguished. There may be a temptation to delay the issuance of a warning until it is certain that the danger will materialize. But by that

time it may be too late to do anything useful, even if the warning is issued.
Indeed, brief forewarning may tend to increase, rather than decrease, the
effects of a disaster (Fritz 61:664; Fritz and Marks 54:37; Janis 62:80).

Officials may be deterred from issuing warnings by the unjustified fear of
panic; by the fear that a false alarm will cause people to disregard the next
warning altogether; by pressure from local business interests which do not want
to suffer economic loss from unnecessary disruption; and from fear that they
may be held personally or politically accountable for a false alarm. Unfortu-
nately, the burden of a decision to issue a public warning falls not infrequently
on the shoulders of a deputy or assistant official who has had no training to
enable him to cope with such a momentous and unexpected happening. But leaders
will eventually be obliged to issue a warning, or the details which show that
they did not, even though a forecast of danger was current. Whether the event
occurs or not, undue delay will diminish public confidence in the officials.
If the disaster does occur, then it is members of the public who pay with
their lives.

The occasional unreliability of professional hazard estimates, complicates a
decision to issue a warning. As large disaster events are comparatively
infrequent in comparison to the period of scientific record-keeping, there is
often little data on which reliable forecasts can be based. Also, in many
developing nations the networks for collecting data are still at an early
stage of development. The technical expertise required for interpretation is
scarce, and the communication systems needed to relay the forecasts to decision-
makers may be handicapped by a lack of organization and inappropriate protocol.

Most developing countries will therefore rely on much less data than is ideal

for reliable forecasting (Beyer 74:269). There may be a tendency too, for some

experts to mislead non-professionals by oversimplifying the information offered.

This is done either because the information itself is too complicated to be

understood by an untrained person, or because of a desire to appear helpful

when there is little helpful which can be said (Burton et al 68:16). In some

societies, the difference between non-scientific predictions by seers, magicians

and the like, and the highly credible but probabilistic forecasts issued by

scientific institutions, may not be readily understood. Consequently, attempting

to issue warnings with statements of probability attached may be interpreted

as admission of official doubt (NRC 75:30) and a lack of government confidence

in its own word.

This raises the question of false alarms. A warning official might be hesitant

about issuing a warning for any or all of the reasons listed above. Yet evi-

dence gathered from situations in which false alarms have been given, suggests

that the reaction of the public will depend on whether people can perceive that

they were indeed vulnerable, notwithstanding that they escaped injury. If a

neighboring community is affected by wind or floods predicted for one's own

locality, or if the event occurs but was not as serious as was predicted, then

the alarm will have been only partially falsified. Rather than being lead to

mistrust future warnings, people are likely to take such signs as evidence of

the fact that they should have taken the warning more seriously than they in

fact did. In this situation, recrimination for a false alarm is unlikely

(Janis 62:84-6; Mileti et al 75:41).

The organization of a warning system and the training of officials and volunteers to man it are important matters dealt with in a companion volume in this series.* However, some practical observations of sociological interest are pertinent here.

It is most important that warning messages be clear and full in content. It will be difficult enough to get people to act on a warning which is couched even in definitive terms. Any attempt on the part of the official to water down the information just in case it be a false alarm, will result in a comparatively useless statement. The more graphic the description, the more effective the message will be. The phrasing "There will be high water", for example, is likely to be less meaningful than "All of the houses in James Street will be flooded to their upper story windows". Any ambiguity or area of doubt left open will permit of escapist interpretations and will delay action while additional information is sought. Ignorance not only delays response, but it allows purely neutral pieces of information to be interpreted as mysterious, or having potentially ominous signs. The terminology used should therefore have a standardized meaning which is readily understood by all. In the early years after establishing a warning system, it will be necessary to supplement such standard phrases as "warning", "watch" or "alert" with full explanations in simple language of what each phrase means.

A signal is not, by itself, the same thing as a warning. A warning should be a call to action and not just a sign of danger. Information about what to do must be in the hands of the population before the warning signal is given. The signal then becomes a message which says "now is the time to do it". The more precise information that can be provided about what people should do, or

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where they should go, the more likely are they to respond in constructive ways.
Prior training should be given in the recognition of warning signs and audible
signals. If testing of the signal is necessary, then this should be done at
regular times or with advance announcement that it is a test and not a real
warning. The organization and deployment of trained wardens will, perhaps more
than any other measure, ensure that the population knows what to do when the
time comes (Dynes 70:70; Williams 64:98-100; Yu and Haussmann 77).

The choice of channels for communications is also important. There are formal
sources such as the radio, TV, newspapers, and the police; and there are informal
sources such as village elders or the neighbors. Each of these sources will
speak with different degrees of authoritativeness and will be accorded corre-
sponding credibility. The differences will vary in relation to the culture and
the social structure prevailing. In one community, informal communication from
kinfolk may be more readily believed than messages from officials; in another,
officials (especially those in uniform) may be given higher credence. However,
in any culture, belief in a warning will probably be greater where it is
delivered in a personal manner rather than communicated by some impersonal
medium. The use of many different channels of communication has the advantage
not only that the message is widely disseminated, but that people have an
opportunity to confirm the truth of the first warning message they receive.
However, when there is more than one source transmitting the warning, oppor-
tunities are created for distortion, attenuation and contradiction. Strict
government control of the form of presentation may therefore be necessary to
ensure uniformity (Clifford 56; Drabek 69:343-8; Fritz 61:667; Gane 74:15;
McLuckie 70a; Mileti et al 75:45; Moore 63; Williams 64:84-94).

The question of timing is important too. Where people will be and what they
will be doing changes according to the time of day, the day of the week and
the month of the year. If the warning is to be delivered at night, then word
of mouth and the radio can be discounted. In the summer people may be found
in the fields, and in the winter in their homes. Different social groups also
have different patterns of TV viewing and radio listening. Effective warning
must take all these factors into account.

There are an impressive number of internal and external factors which can work
to block the relay of any warning signal. The social factors include inter-
agency relationships which are ill-suited to good communication; the lack of
adequate feedback within the system; and the expectations and needs of the
human operators. Without adequate experience or training, operators may be
prone to try to contact the source from which they received the message to
enquire whether it is "the real thing" before they relay it. If this happens
at each stage of the message's journey, it will be much delayed, if it arrives
at all (Dalitz 76:27; Williams 64:91-100).

Special problems associated with warnings will arise in those very few coun-
tries of the world which are able to develop methods for the forecasting of
earthquakes. Earthquake prediction is still in a research stage but it can
be expected that, eventually, it will be possible to forecast the occurrence
of potentially damaging 'quakes up to several years in advance. It is hoped
that the recognition of precursory signs will allow of exact forecasting days
or hours before the event. But for at least a generation, no predictions

are likely to be made with absolute certainty. Many false alarms can be expected. Consequently, the potential for community disruption caused by erroneous predictions, and from 'quakes which are not predicted but which occur, will be much greater than is generally the case with other kinds of disaster. There will be no visible evidence to confirm that an earthquake could have occurred, or that it may still occur. Earthquake warnings will be distinctive in the extent to which public response will depend on the faith people are willing to place in scientific methods. Unlike other types of disaster, when an earthquake is forecast and does not materialize, it does not go away. Indeed, the risk may increase. With the very long-term forecasts which will be possible, it may be difficult for the authorities to prevent the population from becoming complacent. Disbelief and skepticism may even increase the costs of a predicted 'quake.

In a free market economy there may be unfortunate economic effects as the result of an earthquake prediction. These could be an outflow of capital from the area; a reluctance to grant mortgages for home building and other purposes; a refusal to grant insurance coverage, or to renew existing policies; increased unemployment as a result of the effect on business; and reduced tax revenues for similar reasons. There would be many new opportunities for political and social dissension. A prediction would affect the wealth and welfare of the population unequally. Access to "inside information" as to the existence of an earthquake prediction would enable privileged groups to speculate on the property market. Those who acquired information later, or those who, by reason of low social status, are not easily contacted by the government, can be expected to suffer as a result. Unless countervailing policies are adopted, the net effect will be a strongly inegalitarian redistribution of wealth (NRC 75).

2.3   ZONING LEGISLATION AND BUILDING CODES

Although it is generally not possible to predict when a natural phenomenon will strike, it is generally known where they are most likely to occur. Seismic fault zones, flood plains, river deltas and avalanche corridors, for example, are identifiable and can be mapped. Even in the case of tropical storms, which have their own trajectories, it is known that approximately 90 to 95 percent of the human losses and property damage are attributable to the action of water, not to the effects of wind. This knowledge has obvious implications for the safe location and construction of human settlements.

There is a wide range of physical measures which can be taken to reduce vulnerability. Among these are the legislation and enforcement of zoning ordinances, subdivision regulations and building codes; the evacuation of vulnerable areas and the vacating of dangerous structures; the protection of water supplies, essential communications and transport facilities; checking vulnerable dams, nuclear plants, and similar engineering works against failure; and giving attention to the repair, maintenance and strengthening of existing buildings and other structures.

As indicated in Chapter One, the process of rural-urban migration induces more and more people in developing countries to settle in those urban areas which are extremely vulnerable to disaster. The concentration of a population in the urban area does not necessarily increase a country's overall vulnerability, but it does increase the potential for catastrophic loss (White and Haas 75:106). Though it may be very difficult and expensive to apply safe building codes

and zoning legislation to existing development, it is possible to define areas where preventive measures will be most effective and to assign priorities for remedial attention. By anticipating future growth, city governments can ensure that they influence the direction of the development and steer it clear of the most vulnerable areas. The doubling of the world's population in the next thirty years will demand the construction of more housing than has been built in previous history. Much of this will be in the urban and peri-urban areas. Therefore, giving high priority to the choice of locations for all types of construction will provide a high-benefit, low-cost option in hazard prevention.

It is worth noting that, if the above policy is to be of benefit to low-income groups, active government intervention in the purchase and marketing of suitable low-cost sites is likely to be a necessary corollary to the enforcement of safe zoning ordinances. Ordinarily in market economies, the section of the population least able to purchase safe land is that with least market power. Without a properly integrated policy, there is a danger that existing inequities could be intensified by otherwise well-intentioned land-use legislation. The fact that, in the past, many low-cost site-and-service plots have ended up in the hands of comparatively wealthy buyers, counsels caution in regulating occupational densities and the quality of buildings to be erected. The more restrictive the provision, the more difficult it will be for the most needy to take advantage of the government's good offices (Koenigsberger 76:69-70; UNDRO 76:8-9; UNEP 77:15).

There are many circumstances in which the zoning of land for less intensive use will not be considered feasible. Where there is intense pressure on available farming land, foregoing the use of good soil or easily accessible locations

for safety reasons may be considered wasteful and counterproductive in the
achievement of long-term goals (Yu and Haussmann 77). The relocation of industry
and commerce could cause unwelcome unemployment. A government intent on attract-
ing or retaining a particular firm in an area may be persuaded to sacrifice its
interest in securing a safe location to the need for sources of employment.

By amalgamating disaster prevention objectives with other types of social
improvement program, considerable savings in cost can be obtained while achieving
on both fronts. Where, for example, flood plain regulation is linked to urban
renewal, park and open space development, an environment can be created which
is simultaneously safe and pleasant to live in.

The legislation and enforcement of building codes is another weapon in the
armory of disaster prevention. A building code is primarily a mandate to be
followed on new construction, but a code can also be used as the basis for
recommendations to owners on how existing buildings should be made safer for
occupants and passers-by. Standards can be of two types: those specifying
performance requirements for particular types of building, and those specifying
acceptable forms of design and materials to be used. Generally the second type
is more easily understood but the performance type allows for innovation and
is, ultimately, more just.

There is little point in legislating regulations unless there is both a
building industry which understands and is prepared to abide by the regulations,
and an adequate supply of competent building inspectors able to enforce them.
With respect to the building industry, a program aimed at raising the level

of technical competence of builders may be required, giving special emphasis to the use of disaster-resistant construction techniques. The greater the participation of the building industry in the framing of the regulations, the more likely it is to adhere to them. With respect to the inspectorate, the more attractive are its pay and conditions of service, the less likely it is to be rendered ineffective by bribery and corruption.

Notwithstanding the general desirability of building regulation, there are a number of reasons why developing countries may find it difficult to obtain early reductions in vulnerability by this method. First of all, it must be noted that the major source of casualties involving buildings, at least in earthquake zones, does not arise from the large buildings which are subject to building codes. It is the many small dwellings in vulnerable settings which impose the largest toll on human life. In many developing countries, it is the householder who builds his own dwelling. Without an army of educators and enforcement personnel and some considerable economic incentives for the home-builder, there can be little hope for the application of building codes to the do-it-yourself sector. Second, the application of building standards costs money. Not only are the administrative costs high, but the additional materials (or quality or sizes of materials) required, may easily put disaster-resistant construction beyond the means of low-income families. In such circumstances, the objective of a building code should be: first, to obtain the safety of human lives; second, to safeguard important equipment; and third, to ensure that, as far as possible, the building be in a repairable condition after impact. Depending on the type of hazard, attention should be given primarily to foundations, roof supports, roofs, and walls, with suitable

openings for rapid exit. The orientation of the buildings to topographical features can also play a vital role in obtaining safety at low cost. In case of collapse, the building materials should be of types which are salvageable for reuse in temporary and permanent structures (INTERTECT 77).

An inexpensive but highly effective policy for disaster prevention which can be related to the development of zoning legislation and building codes, demands that financial assistance from government be subject to compliance with safety legislation. In highly hazardous areas, a government might deny funds for construction and development, refuse to grant other government benefits, or withhold leases on vulnerable buildings. The granting of funds for the construction of local community facilities should also be made conditional on compliance with the safety code. Where government funds are allocated to local executive bodies, there is sometimes a tendency to "stretch" the funds by cutting down on official specifications in order to obtain more, or more spacious, facilities. An official inspection would limit this expediency (Gane 75:21).

2.4 INSURANCE

As part of a coordinated plan for disaster prevention and mitigation, private and/or government insurance can have an important role. The promotion of disaster insurance is a strategy which effectively shifts the responsibility for unavoidable damage from the government onto the shoulders of private citizens and business concerns. It does this by enabling people to reduce

future losses at the cost of sacrificing a portion of their present income.
Even though insurance could never compensate totally for the human, social and
economic costs of disaster, by spreading nature's burden more evenly over time,
and distributing it among those who decide to take the risk, some of the sting
can be removed from the disaster event. A compulsory insurance forcibly
protects those who are normally least able to bear the losses, but on whom
they generally fall most heavily.

In some countries crop and animal insurance is available for losses up to a
certain percentage of the established average yield. This can be part of a
government package aimed at stimulating greater production (White 74:262). In
most of the more developed countries, insurance against specific hazards can
be purchased from private insurance companies. However, the availability of
insurance is by no means uniform. Separate policies are often required for
different types of risk, and mandatory deductibles seriously reduce the attrac-
tiveness of policies. In some areas, and for some risks, no coverage is
available at all.

As well as bringing immediate economic benefits in times of crisis, insurance
also performs an educational function. It is assumed that by developing rate
structures that reflect local hazards, and requiring that these rates be borne
by those with decision-making power, people will be made more aware of the
hazards to which they are exposed. To be effective in this, rates would need to
take into account the exposure from all perils and not be oriented only to one
type of hazard. If attracted by lower premiums, it is reasonable to expect
that policy-holders would act to reduce the risk of loss. A government can
reinforce this educational effect by ensuring that any financial assistance

which it makes available be conditional on the purchase of adequate insurance coverage. Insurance rates would have to vary from area to area in order that they reflect different levels of vulnerability; but to maintain public confidence, it would be necessary to ensure that the rates were consistent and fairly apportioned. People who deliberately located in a vulnerable area could reasonably be expected to bear the full cost of insurance, although a government might wish to extend coverage at a subsidized rate to those people who are already there.

There are a number of dangers and difficulties which may be encountered in any attempt to establish a disaster insurance scheme. With respect to the dangers, the first is that, unless the premium rates are proportionate to the hazards, or linked to land-use regulations, businesses and residents may be encouraged to stay in dangerous areas without taking steps to reduce the insured risk. Unless the policy penalizes improper location or inadequate protective measures, it will be in the interests of those most vulnerable to press for maximum protection, regardless of the cost to society at large. One method of avoiding this danger is to determine premiums by inspection of the property to be insured, and then to issue coverage conditional on the satisfactory implementation of stipulated measures to reduce vulnerability. The second danger is that insurance will augment the already high cost of housing. For the poorest families, compulsory insurance will be an onerous burden.

The difficulties to be negotiated in establishing disaster insurance area as follows. First, it may be argued that to coerce the owner of a building to pay to protect his own property is an infringement of his liberty. One has

to distinguish, however, whether it is the owner's own life which is at stake
or the lives of others who occupy the property. Second, a catastrophe which
occurs when an insurance scheme is very young, or which affects a large part
of the nation, could effectively annihilate the plan, bringing the government
into disrepute. Conventional insurance schemes are designed to spread risk
among individuals and across geographical areas. They are not usually designed
to spread risk from one year to the next. Private insurance companies are
loathe to accept such risks and in order to provide an effective service,
reinsurance arrangements or government guarantees would be needed. Small
countries might find it advantageous to unite in an insurance pool so that
risks could be shared more widely.

A third difficulty is that there is a tremendous dearth of accurate information
on actual and expected disaster losses. The risks with respect to individual
parcels of land are also, for the most part, largely unknown. Even in the more
developed countries where risk zones have been outlined, they are so broad as
to make their use for insurance purposes somewhat arbitrary. The classification
of property not only requires an army of technical personnel but, in a market
economy, is liable to affect property values. The fourth difficulty, there-
fore, is that government action affecting private interests can be expected to
meet with stiff opposition. The fifth possible difficulty in government-
administered schemes is that, when policy-holders have contributed to the plan
for many years without needing compensation, they may feel that their money is
being hoarded to no good purpose. In these circumstances, the government may
find it difficult to refuse to pay up on any minor claim, even though no major
disaster has occurred. To discriminate between claims may be political suicide,

while not to do so would militate against the long-term purpose of providing

for a major calamity (Burton et al 68; Burton et al 78; NRC 75; O'Riordan 74;

Renshaw 61; USOEP 72).

2.5 WHAT INFLUENCES DECISION-MAKING IN COPING WITH HAZARD

The level of risk in any one place will be the product of many separate decisions

made by national agencies, government departments, industrial corporations,

local community councils, and private citizens acting on their own account.

Notwithstanding the fact that it is usually the private individual who chooses

to remain in, or move into, a hazardous area, the decisions made by any of the

larger units will press heavily on individual choice. A government's decision

to protect a coastline or to guarantee relief, or a firm's decision to establish

a factory, can induce many thousands of people to relocate in the new area,

falsely believing that they have obtained security (Burton et al 78:10-11,81,

147-8; Islam 74; White and Haas 75:8). In order to be able to influence

decision-making in a way which will make individuals and communities less

disaster-prone, it is necessary to understand how and why people, and organi-

zations, do indeed make decisions.

Not enough is known on the subject to guide effective government policy, but

what we do know can be summarized as follows. People persistently underesti-

mate the hazards to which they are exposed (Burton et al 68; Heathcote 69;

Mileti et al 75:24; White et al 58). People generally believe that they have

a much better picture of the truth than they really do. Accurate perception

is particularly difficult in the case of low-probability, high-impact disasters,
although the more frequent the occurrence, the more likely is the estimate to
be correct and the more likely are people to take preventive or remedial action.
The greater the regularity of events, the more acute will be public awareness,
although a recent severe event tends to obscure recollection of earlier events.
In societies with great material wealth, awareness of hazard comes much less
easily than in poorer societies. Concomitantly, poorer societies tend to be
moved to action sooner than the richer ones (Burton et al 78:100-2,212; UNEP
77:18).

People employ numerous psychological mechanisms to reduce the anxiety associated
with a possible, but uncertain, future disaster. People are inclined to believe
that disaster events are cyclical, following a determined pattern in history.
Others, using the "gambler's fallacy", think that an event this year reduces
the risk for next year, and so on. Some people will deny that calamitous
events in the past can reoccur, claiming that they were the products of freak
combinations of circumstances. Still others place the total responsibility for
a disaster with some higher power -- God, the government, or some foreign power.
By putting the causal agent outside of the realm of influence, there is no need
to think about the risk; at least, it appears useless to do so (Burton et al
78:98; Slovic et al 74:190; Taylor 77b; Western and Milne 76:9).

Perception of hazard does not usually vary by educational level or socio-
economic status (Islam 74:21). Age and economic situation may, however,
influence an individual's preparedness to take action. Urban dwellers appear
to be less sensitive to the probability of disaster than do their rural cousins

when confronted with the same phenomena. Those whose economic interests are threatened are likely to have a more acute perception than those who have less to lose. Thus, in urban settings, owners are more sensitive than tenants; while in rural settings, the opposite seems to be true (Burton et al 78:100-2; Mileti et al 75:24,31).

In contemplating action, it is known that people do not arrive at decisions on the basis of the economist's theory of optimization. They do not necessarily strive to maximize net marginal returns. A more usual goal is for people to achieve a state of affairs which satisfies their minimum requirements (Simon 56:129). We also know that people do not take into account the full range of alternatives which are available to them, either because of organizational limitations, cultural traditions, or lack of awareness (Slovic et al 74:190). The difficulty appears to be primarily one of understanding the complex dimensions of the choices available (cognitive), rather than a lack of willingness to do so. Mental devices for simplifying the world are used so that the decision-maker can handle the choices more easily. Administrators tend to avoid the difficult task of taking all important factors into consideration and weighing their merits and demerits. Instead, they often employ a method of successive limited comparison, whereby consideration is given only to those policies which differ by small degrees from those already in effect. Fundamental enquiry into the cause and effect of policies is thereby avoided (Lindblom 64).

Four factors are found to affect the types of action taken in relation to any one place. These are: the characteristics of the disaster expected; the local

experience in dealing with it; the degree of commitment to the area; and the level of material wealth prevailing (Burton et al 78:210).

For the individual, experience of the hazard -- in length of exposure to its consequences, and one's subjective assessment of the risk -- is important in influencing the protective measures adopted. Material wealth will determine the extent to which different measures can be afforded. Wealthier individuals are more able to experiment with a variety of measures against flood or drought. They have both the cash to do so and greater reserves to fall back on if they fail. The range of technology which is perceived to be available is an impor- tant facet of wealth. Perception of the risk, and availability of resources with which to do something about it, are closely related. Costly preventive measures will only be undertaken if one has experience of the disaster in question. The experience must not only be impressive, but suffiently frequent to make it appear worthwhile to sacrifice income today for safety tomorrow (Burton 61:91; Burton et al 68:17; Kates 62:140; Slovic et al 74:190; Wisner 76; Wisner et al 77:51).

The pressures on the individual from his social group will be influential in encouraging or discouraging adherence to, or departure from, traditional patterns. The value placed on the loss of time, of property, and of income, differs greatly according to the economic and cultural patterns of the society. Some societies place more emphasis than others on the power of self-help and independent effort. The prevailing beliefs as to the appropriate roles for the individual, the community, and the government, are also highly influential in determining response to hazard. Who is to be responsible for carrying out

which kinds of works of prevention and mitigation? Beliefs are created by

precedents and reinforced by the feeling that if one were to take action more

appropriate to another, it might dissuade the responsible agent from fulfilling

its duty (Burton et al 78:105-6; Sims and Baumann 72; Taylor 78).

2.6   EDUCATION AND PUBLIC INFORMATION

The guidance which a government wishes to exercise over individual and community

risk-taking will be a reflection of its wider political and social ethos. How-

ever, it is safe to assume that, given the necessary resources, most modern

states will wish to provide some public information and education relating to

the prevention of disaster. To what objectives might such education be directed?

To get people to act to prevent future suffering, people must be continually

reminded of what it was like on past occasions. One of the ways of reminding

them is to engage in a campaign designed to communicate an understanding of the

causes of disaster and the resultant loss of life. Not only will the public

then better appreciate the need for inconvenient and sometimes costly hazard-

reduction measures, but it can, by the same campaign, be equipped with the

technical know-how with which to make the environment safer. Depending on the

society and the hazard(s) in question, training can include instruction on

disaster-resistant construction techniques and appropriate low-risk agricul-

tural practices. Other themes which can usefully be dealt with in public

education programs are the extent of hazardous zones; the importance of

adequate site selection; the need for the enforcement of building codes;

the availability of private insurance policies; and/or the importance of main-
taining social security contributions. Standards of safe building practice
should become common public knowledge.

Educational programs can be conducted on many levels, in formal and informal
settings. The groups on which efforts are most usefully focused are public
officials and national planners; health planners and health services personnel;
agricultural planners and extensionists; members of the building professions
and construction industry; the mass media -- newspapers, radio and TV networks;
and, not least, the general public. Each should be appraised of its responsi-
bilities before, during and after an emergency. For those who have responsi-
bilities for transmitting information to others, advice on how to communicate
effectively may also be helpful. Methods for reaching the socially isolated,
unattached, widowed, elderly, blind, deaf, illiterate, or foreign-speaking
residents will need to be developed if a campaign is to reach a wide audience.

Public education is needed not only to communicate factual information, but to
develop a faith in the power of organized effort and carefully applied tech-
nology. Ordinary people's comprehension of the range of available measures
depends on a belief that a coming disaster event can be foreseen; that it is
not evil to "tempt fate" by taking steps to prevent it; and that the measures
will indeed afford some protection (Burton et al 78:103; Dupree and Roder 74:117;
Williams 64:100). Disasters are open to magical interpretation but, while non-
scientific beliefs may be internally consistent, for the purpose of reducing
losses it is necessary for the public education media to project a vision of
man's ability to manipulate nature in regular and reliable fashion.

Apart from the many obstacles which stand in the way of any educational and
information campaign concerned with important social problems, there are some
peculiar to disaster prevention. One of the most basic difficulties is that
there are great differences among individuals and among communities in the
perception of hazards (Burton et al 68:15). A threat which will drive one
person to action will leave another person unmoved. This makes it especially
difficult to design a campaign on the basis of commonly shared assumptions.
It is probably easier to persuade people to take preventive measures against
disasters of high frequency than it is to get them to act against the relatively
rare occurrence, even if this be of great magnitude (Kates 70;Mileti et al 75:27).
Second, the occupancy of dwellings in high-hazard areas tends to be rather more
unstable than for the population at large. Migration in and out, and returning
residents, make for an unstable target group (Burton and Kates 64; Mileti et al
75:31; White et al 58). A third difficulty is that foreign-speaking residents
and others with whom it is difficult to communicate, will be among the economi-
cally less advantaged who are disproportionately located in vulnerable housing
and neighborhoods (NRC 75:99). Finally, the poor, and minority groups in
general, may possess understandings of their own best interests which are quite
different from those held by government. For example, in some countries certain
groups believe that building codes have more to do with protecting the building
industry than with the safety of occupants. Code enforcement may be feared on
the grounds that it will lead to higher rents. Similarly, it is known that
property redevelopment often results in the displacement of the poor to make
way for wealthier and socially more acceptable tenants. In these circumstances,
a disaster prevention by any of these routes is not likely to commend itself
to popular sympathy. Where the area to be cleared is heavily ethnic, overtones
of racial oppression may also develop.

As indicated above in the context of obtaining a response to warning, previous disaster experience -- if of a relevant kind -- will be helpful in ensuring a constructive response from the public. More than this, however. The available evidence is that educational efforts are likely to be most effective immediately after a disaster event. The education will be perceived as relating to a matter of immediate and tangible concern. It can also be expected that the tolerance levels for the risk in question will drop markedly at this time (Mileti et al 75:27; NRC 75:128; Saarinen 66; White and Haas 75:87). Even so, the many other demands which are made on scarce resources during an emergency may mean that the implementation of hazard reduction measures is delayed for a considerable period (Thompson and Thompson 77).

Where the previous disaster experience is <u>dissimilar</u> to the immediate situation, then the experience may provide a false sense of security and thus lessen the importance given to educational material (Dynes 70:70; McLuckie 70; Mileti et al 75:39,97).

Contrary to what might be assumed from the above, there is no direct link between awareness of hazard potential and decision-making processes for the avoidance of future risk (Islam 74:19,24; Kates 71; Mileti et al 75:24,27). Many factors influence a decision to act for the reduction of vulnerability: awareness of risk is but one of them. It is rare, for example, that individuals have complete information in appraising the alternatives open to them. Even if they were to be provided with such information, most people would have trouble in processing it to arrive at a plan of action affording maximum utility. Even on the rare occasions when the outcomes can be calculated, people differ

greatly in the way they judge the consequences (Burton et al 78:52,86). Cognitive processes, value orientations and affective attachments all work to determine action (or inaction).

It is not entirely certain to what degree each of the above elements influences action but, for want of any more precise guidance, it may be assumed that achieving awareness of the hazard is the first step. As the appraisal of extreme events and the canvass of alternative courses of action are interdependent (Burton et al 78:87,96-8), there will need to be a parallel opening of options for hazard reduction. It is these joint objectives which can best be served by a public information and education campaign.

2.7 PUBLIC PARTICIPATION

Public participation has been recommended as an aid to almost every kind of social improvement program including disaster prevention. What is public participation, and what are its possible objectives? At the simplest level, by the exercise of his franchise, a citizen elects to office those who pursue policies of which he approves, and dismisses those who pursue policies which are unacceptable. Alternatively, or in addition, public participation can involve the direct participation of citizens in part of the decision-making process, usually at the local level. Such participation will require formal institutional vehicles for the canvassing of opinion and/or direct voting on policies of public interest. In either case, groups are often formed to represent what they conceive of as the public interest, while other groups

represent agglomerations of private interest. Participation in any of these
activities is also subsumed under the phrase "public participation". The
fourth possible use of the phrase refers to the physical participation of
members of the community in the implementation of policies, howsoever they
have been decided upon.

What are the benefits to be obtained from public participation? First, it
promotes awareness of the preventive measures being pursued and, less easily,
of the hazards addressed. If the rationale is intelligible and meets with
public approval, the greater awareness may promote trust in the efforts of
community leaders and can augment public support for some of the less popular
but essential measures for protecting the community. Second, greater awareness
of the hazard and what the government is doing about it will enhance the credi-
bility of forecasts and warnings. With respect to warnings, the greater the
practical participation of the population in the warning system, the more
effective it is likely to be. The fourth advantage of public participation
is that it can be mobilized to help implement a wide range of measures for
hazard reduction. Existing voluntary groups can be called upon to devise
plans for actions to be taken in the event of a disaster; to help in sign-
posting areas of danger; to inform the public services of individuals who may
suffer unduly because of hazard reduction measures; and generally, to encourage
community cooperation by engaging in educational campaigns and the dissemination
of public information.

Members of the public often have a higher degree of awareness of hazard than
is commonly assumed by professional planners. With respect to forecasts, it

is those people who live in the area who are often best able to detect unusual
signs foreboding disaster. In any population there are usually people whose
occupations make them especially sensitive to certain kinds of environmental
changes. This is particularly true of drought, flood (other than flash flood),
and avalanche. In the People's Republic of China an earthquake forecasting
system also makes use of multiple observations by local people. To be effec-
tive and reliable however, it is necessary that the local observations be tied
in to a network of scientific observations to which they provide useful
adjuncts.

Many communities employ a number of hazard-reduction techniques which are a
result of many centuries of cultural adaptations to nature. Some of these
adaptations aim to prevent disaster and others attempt to mitigate the effects
of those disasters that do occur. A change in location would come under the
first heading, while cultivating many different crops, and interplanting, can
be regarded as a form of disaster mitigation. However, not all of the adjust-
ments which people practice are necessarily perceived as anti-disaster measures.
In particular, those which are associated with distinctions of socio-economic
class -- style of house-building or number of livestock for example -- are
likely to go unnoticed in a non-disaster context (Ramachandran and Thakur 74:42).
In agriculture, seasonal activities tend in any case to be adjusted to hazards
such as flood, wind and storm. From a government point of view, a relatively
low-cost and high-benefit approach is to build upon these local patterns of
adjustment. By fostering those which seem to be effective, discouraging those
which are wasteful, and introducing new methods of appropriate technology, a
government can save itself valuable resources while avoiding the wholesale

destruction of traditional ways. But to do this requires the active participation of the people in programs managed jointly with government.

The difficulties to be encountered in attempting to stimulate public participation are numerous. First, members of the public who contact or who are contacted by officials, are not likely to be representative of the population as a whole. They will tend to be the more literate, the more vocal, and the politically and economically more astute (Beyer 74:273). Second, the way in which people express their desires and interests is likely to differ considerably from the jargon used by the professional planners. Maps outlining hazardous areas are not likely to be understood by ordinary people, even in countries with high levels of literacy. Concepts such as "growth", "diversification" or "risk adjustment" have little meaning for non-specialists. To enable popular participation in programs of action, as well as in public decision-making, alternatives and objectives have to be expressed in terems which are tangible and meaningful to the ordinary citizen.

A third difficulty is that those members of the public who have had previous but not very profitable contact with government officials are unlikely to be good candidates for participation in a new government program. In some circumstances, the widespread distrust of government intentions and of public officials can prove to be an insurmountable obstacle. This is especially true where it is believed that efforts in disaster prevention are tied to attempts to improve the taxation base. The sense of alienation which sections of the communith may feel towards the government will be aggravated, too, by any delays on the government's part in meeting its obligations.

In the fourth place, it must be remembered that risk from any particular disaster may be only one of the many which confront an ordinary person in his or her struggle to obtain a living. The idea of making sacrifices in order to curb one risk may not be very appealing, especially when the risk is not conspicuous and does not come high up the list of felt needs. From the individual's point of view, it may make more sense to improve one's own economic standing, so that life's risks may be protected against in general, than to lend support to some government-sponsored activity which will result in the reduction of only one risk, even though this reduction be guaranteed. A fifth and related complication is that, while governments can afford to plan for reductions in risk several years hence, the time horizon of the low-income citizen will generally be much less. Taking care of today's survival is likely to be more important than protecting against future loss which is, in any case, uncertain.

Very frequently, attempts are made to obtain public participation in programs the details of which have already been fashioned by government. For the reasons outlined above, such attempts to legitimate pre-defined policies are doomed to failure. Only when the details of a program are fashioned by the people whom it is to serve, will it correspond to their interests and engage their active cooperation. A wide margin for adaptation to local circumstances and for the exercise of local initiative should be allowed in any disaster-related activity. In general, the motto should be: Adjust the plan to the people, not the people to the plan. It is much easier for a government to achieve its own objectives in hazard reduction if these correspond with the priorities of the people who are called upon to make the plan work.

If a government encourages local initiative, then it should be prepared to support it when necessary. Funds and/or specialized technical assistance may be needed. If government support cannot be made available, then adequate explanations and other encouragement must be provided to ensure that the initial enthusiasm is converted to self-reliant action and not into frustration and cynicism. Generally, those communities which show most confidence in tackling other community problems will also be the ones to show most enthusiasm for disaster prevention.

Chapter Three

DISASTER PREPAREDNESS

Whereas disaster prevention involves an array of comprehensive and intersectorial measures, disaster preparedness is specifically organizational in character. It is concerned with making ready for rescue, relief and rehabilitation in those emergencies which cannot be avoided. While a community will inevitably recover from most disasters to which it is subject, good planning and leadership can make important differences in how rapidly, smoothly or efficiently life returns to normal (Thompson and Hawkes 62:298). It is to these goals that disaster preparedness addresses itself.

Disaster preparedness planning apportions responsibility for action among the family, the community, the regional government, and the national government. There is an inevitable interdependency among the various social levels, and one can realistically be expected to help the others. In this way, the burden is spread across the society as a whole. The correct locus of responsibility for the care of the afflicted and the reinstatement of facilities will vary according to the type of society, and particularly according to the extent to which government generally accepts responsibility for social welfare.

Whether or not an investment in community preparedness is considered worthwhile will depend on the amount by which it would reduce losses in various types of disaster, relative to the probability of occurrence (Barton 69:198). Evidently, preparedness would be more worthwhile for a community which suffered frequently

than for one which was stricken only rarely. Indeed, since activities soon lose their meaning in the absence of an immediate threat, preparedness to cope with a low-probability event may be regarded not only as a luxury, but highly impractical. Conversely, the more predictable the disaster, the easier it will be to institute preparedness measures, and the more effective they will be (McLuckie 70; Mileti et al 75:97; NRC 75:128).

A guiding principle in the formulation of a preparedness plan is that the application of measures to the existing situation should result in a totally integrated system. For example, money spent on the development of a warning system will be wasted if people living in vulnerable places are left without adequate means of escape when the alarm sounds (White and Haas 75:3). Similarly, it is pointless stockpiling relief supplies if no one has authorization to unlock the warehouse when the supplies are needed.

The plan should identify the population groups most likely to suffer loss and disruption and to need special assistance; and it should make arrangements to offset, insofar as is practicable, the disproportionate burden borne by these groups.

It may be necessary to ensure that the plan is supported by appropriate legislation. In any event, it will need some financial resources to back it up, even if this consists only of earmarking portions of existing budgetary allocations. However, the legislation should not petrify the measures. Revision and improvement of the plan will be essential if it is to keep pace with population growth, changes in communications and new technologies. A major review

of preparedness should be undertaken after every disaster, incorporating in the
new plan lessons from the hard-won experience.

A preparedness plan can be divided into two parts. The first governs actions
which should be taken before a disaster event occurs, while the second lays
contingency plans for procedures to be followed afterwards. With regard to the
management of the post-disaster situation, the plan should concentrate on
defining responsibilities, laying down procedures, and systematizing information
flows. It should not interfere with the freedom of officials to respond to the
exigencies of the emergency in the way they think best. On the contrary, the
plan should assist them by providing reliable information on which they can
base their decisions (Gane 74:16).

In relation to the measures to be taken before an event occurs, the general
objective should be to remold the concept of disaster, so that readiness to meet
one becomes a part of the culture. There is no doubt that if a disaster prepared-
ness plan is to be at all useful, it must live in the minds and experience of
the many people who will be called upon to act in times of crisis. A community
which experiences frequent disaster develops a disaster culture of its own --
a set of attitudes, norms and techniques which enable it to deal with crisis
in a regular fashion, avoiding overreactions and unnecessary loss (Barton 69;
Dynes 70:79; Mileti et al 75:41; Moore 56). In communities which suffer less
frequently, experience needs to be simulated by training and practice. The plan
should therefore set realistic standards of preparedness for each of the public
and voluntary services. Standards should include the appropriate assignation
of responsibility; standards to be met in training, including knowledge of

emergency roles; and the purpose and levels of stockpiles to be maintained. A plan which is kept secret -- for reasons of national security, or other -- will be useless. Even if people know of its existence, there will be no time to assign responsibilities and learn what to do after the event. Careful rehearsal will be required before the disaster to ensure that people learn their roles (Barton 62:244).

The primary purpose of training is to give people knowledge of what they should do and when. It includes knowledge about the potential destructiveness of the disaster agent(s); how natural warning cues and alarm systems are to be interpreted; the measures which can be taken to reduce losses; the efficiency of particular types of action; and, above all, what is to be done when a warning is given. It is important that training encompass all the possible hazards in the area and not just focus on the particular type of disaster thought most likely. The ancillary purposes of disaster training are: to give people knowledge and experience of their role in relation to others in the emergency system; to increase their motivation in the performance of their roles; and to equip them with the specific technical skills which might be useful (Barton 69:139; Dynes 70:80; LeChat 73:8).

Another function of training, essential for key members of organizations, is to instill the idea that they should give first priority to their jobs and not to their families (Dynes 70:154; Mileti et al 75:68). By making organizational members visible, giving them uniforms, or spreading community awareness of their disaster responsibility, they may be persuaded to put their jobs first. In any case, a disaster plan should make provision for such key people to be able to

check on the safety of their families before reporting for duty (LeChat 73:7).

There are three different ways in which people can participate in the emergency social system: as paid members of an organization, as members of a family group, or as community members engaged in formal or informal voluntary activities to help others. As emotional control is facilitated by assignment to a social role entailing responsibility for the welfare of others, this too can be one of the functions of training in an emergency position (Form and Nosow 58; Janis 62:92; Logan et al 52). Jobs to be done include rescue and transportation of the injured; provision of medical care, food and shelter, reassurance and psychological support; and the restoration of damaged facilities. At the same time, non-postponable activities must be continued -- taking care of children, feeding, keeping public order, and maintaining the output of public utilities (Barton 69:125).

In the face of some kinds of threat, such as landslide, flooding from the sea, or potential dam burst, evacuation may be the only safe course of action. However, experience with tsunamis and other threats indicates an uncertain response to calls for voluntary evacuation (NRC 75:113). Successful evacuation requires considerable prior planning and coordination of warning system and evacuation plan (White 74:261). Responsibility for any action at all may be commonly perceived as being the responsibility of the government (Ramachandran and Thakur 74:42). In these circumstances, public training and the appointment of evacuation wardens will be indispensable.

In those communities which suffer very infrequently, long-term standby organizations will not be feasible. In these cases, elite cadres of organizers should be trained, which can be dispersed at the time of a crisis to engage and lead untrained members of the population against the threat (NRC 75:17; Renshaw 61:44).

Numerous government departments, semi-autonomous public agencies, and private voluntary groups will be involved in relief and reconstruction. Many of the tasks to be performed will require active collaboration between some or all of these entities. Methods for communicating with, and between them will be required, and can be planned in advance. The coordination of the response of each agency is best managed by a disaster preparedness office situated close to the source of government power. Depending on the nature of the country's constitution, the Prime Minister's Office or the Office of the President might serve to provide the necessary authority.

Despite much study of disaster preparedness by sociologists, there are few findings other than the importance of prior experience. This would seem to imply that the greater the continuity between disaster roles and the normal responsibilities of an organization, the less problematic mobilization for disaster is likely to be (Mileti et al 75:53). It appears most sensible, therefore, to vest disaster responsibilities with those organizations accustomed to providing services likely to be needed. Public utilities, public works departments (Barton 62:245 and 69:94-5), fire departments, hospitals, and health clinics all respond to minor disasters on a regular basis and can be expected to be useful in a major crisis. However, a knowledge of the area and of the customs and attitudes of the people affected can often be more important than

specific technical skills, especially in rehabilitation and reconstruction. For this reason, churches, schools, community centers and local development agencies can all play useful disaster roles which are auxiliary to their normal functions.

There are other reasons why existing agencies are to be preferred as disaster response vehicles. The requirements in the mix of skills needed for planning and maintenance are probably quite different from those needed to command respect in times of crisis. High-grade leadership qualities are not likely to be found among the staff of a permanent standby organization if, at normal times, its duties are limited to planning and maintenance. This will be true even if such staff are, in a technical sense, well qualified. Second, effective coordination between organizations will depend much more on the pre-existing relationships of trust between individuals than it will on any formal agency agreements. An existing body is able to capitalize on its store of external linkages with individuals and organizations in a way which a new agency is not. Third, many of the measures which can be taken in the name of disaster preparedness are aspects of ongoing development activities. The upgrading of an existing mud road to a paved road, for example, can be an important adjunct to warning and emergency evacuation (Islam 74:25; Ramachandran and Thakur 74:39). Finally, existing organizations provide a ready framework within which to order and rehearse defined emergency roles. Without an ongoing organizational setting, emergency plans will atrophy from want of the human beings which keep them warm.

In communities where disaster-related functions have been assigned by the planning process to specific organizations, there is less post-impact confusion

regarding responsibility and communication channels. There is also more coopera-
tion among rescue units (Mileti et al 75:21). However, the apportionment of
responsibility is not always an easy task. Threatened areas will usually overlap
political boundaries and agreement among different administrations may not be
obtained easily (NRC 75:108). Local government and private agencies may vary
in their capabilities from year to year as the elected officials or staff
change (Kieffer 77:10). Agencies with two distinct levels -- international
and national, or national and local -- may experience profound conflict as a
result of differential interpretations of their respective roles (Adams 70:399;
Miller et al 75:121-2; Taylor 76). Some organizations regard themselves as
having key roles and assume that they should coordinate or direct others'
responses. This is particularly true of police departments, the Red Cross and,
in centralized societies, the military (Anderson 69:252; Mileti et al 75:41).
It must also be remembered that organizations tend to communicate with the same
organizations they did before the disaster (Barton 69; Brouillette 71:180;
Dynes 70; Mileti et al 75:41,93). Difficulty may be encountered in getting them
to cooperate with organizations which they regard as competitors.

The creation of spontaneous ad hoc citizens' committees to provide relief and
reconstruction aid, obviously cannot be planned in advance. Many organizations
which are not primarily disaster- or welfare-oriented may, in times of national
emergency, also turn their hand to the collection and distribution of aid.
However, the degree to which such groups are useful may depend on the support
which is accorded them by government and/or other existing agencies. Without
experience, these groups can all too easily embark on activities which turn out
to be expensive, frustrating, and counterproductive. Contingency plans should

therefore be made to encourage and counsel all these groups in the pursuit of worthwhile options (Taylor 76a and 78).

The structural and normative characteristics of the organization(s) providing the emergency response will be important determinants of both efficiency and effectiveness. It is known, for example, that centralized decision-making may delay community and organizational mobilization prior to impact (IVSO 55; McLuckie 70; Mileti et al 75:53). It is often assumed that military organizations are best equipped to tackle an emergency. It is true that they may have men (Anderson 69:254; Mileti et al 75:83) and certain equipment at their disposal which, when applied to clearly defined situations with simple objectives, can produce rapid and useful results. However, few disaster situations exhibit the clarity of need which can be addressed by organizations having one-way command systems. The precise needs of a civilian population usually vary markedly from place to place. A large bureaucracy, with rigid structure, hierarchical and depersonalized communication systems, standardized procedures, and pre-ordered divisions of labor, cannot bend itself easily or quickly to the needs of individual communities and individual victims. In fact, this handicap applies equally well to such bureaucracies as insurance companies (Leivesley 77:215) as it does to the military (Davis et al 77) and to some of the larger and more established of the voluntary relief agencies. Those organizations modeled on military lines tend also to treat the victims as objects of their assistance. The paternalistic stance of their benefactors is usually bitterly resented by the recipients of aid (Barton 69; Form and Nosow 58; Quarantelli and Dynes 72: 70; Wenger et al 75:36). One should bear these limitations in mind when assigning responsibilities among different organizations.

The requirement for flexibility applies equally to organizations as it does to the plan itself. Both should contain a capability to deal with crises of different proportions. The co-opting of additional resources in personnel, equipment, materials, or monetarily, should be provided for according to the type and level of emergency expected. Of course, as the future is usually predicted on the basis of past experience, there is always the danger that even these contingency plans will be overturned by an event bigger than any previously known (White and Haas 75:79). As the service organizations themselves may be located in the impact zone, provision should be made to relocate headquarters with communication facilities, should the need arise. The fact that emergency organizations operate at different manpower strengths at different times of the day and on different days of the week, will also need to be taken into account in planning a flexible approach; so too will the seasonality of certain types of disaster such as floods, and the changing spatial distribution of the population according to the time of day, day of the week, and month of the year (Dynes 70:65-8).

A useful preparedness measure may be to stockpile items with proven utility. First-aid equipment; boats; tools to facilitate salvage; building materials for emergency and permanent shelters; simple guidelines and training aids for rapid recovery and safe restoration may all be placed at the disposal of a community before a disaster strikes. These items need not necessarily be locked away in a warehouse or depot. Through local organizations they can be injected into the regular life of the community. In this way, an investment in disaster preparedness will represent also an investment in ongoing

community development. In areas where the risk is high and dwellings are vulnerable, emergency shelter units appropriate to the climate and culture might be placed in the vicinity, and distribution plans worked out in advance (Davis et al 77). In view of the enormous variety of subtle differences which exist from area to area in building styles, clothing habits and food tastes, it is, however, generally not advisable to stockpile such items on a national basis. With the exception of a very limited number of standard items, information about the precise requirements of victims is best collected after the event (Taylor 77b). Two other useful pre-disaster measures can be the establishing of criteria for the making of expenditures from disaster funds (Taylor et al 76: 286), or releasing supplies from stockpiles; and the listing in advance of those resources which are not readily available, but which could prove useful when a disaster strikes (Mileti et al 75:21).

If the establishment of emergency shelters is deemed necessary, two points should be borne in mind. Urban areas will not have the same kinship structures as do rural areas. For any given risk they will, therefore, probably need more shelter space per head of the population (Mileti et al 75:18; Moore et al 63: 127). School buildings often provide the only local refuges available. But for families with children they may offer the added advantage that they afford a familiar, relatively secure environment for the children where they will be surrounded by many of their peers (Webber 76:61).