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TECHNOLOGICAL AND NATURAL DISASTERS AND ECOLOGICAL PROBLEMS: SIMILARITIES AND DIFFERENCES IN PLANNING FOR AND MANAGING THEM*

E. L. Quarantelli

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*Written remarks prepared as background for an invited oral presentation at the Colloquium on Challenges of Technological and Ecological Disasters on May 11, 1993, in Mexico City, Mexico. Some of the ideas expressed have also been set forth in earlier publications (see Quarantelli, 1982; 1985; 1986; 1987; 1988; 1991a and b).

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ABSTRACT

Our papers has five major parts in dealing with the general question: for planning and managing purposes to what extent can destructive and damaging situations as are occasioned by natural disasters, civil strife and riots, technological disasters, and ecological problems be viewed as essentially similar phenomena?

In the first part, we make a conceptual distinction between natural and technological disasters as consensus occasions and other crises that are of a conflictive nature. These two types of crises require somewhat different kinds of planning and managing, so conflict occasions are not further examined. Also, natural and technological disasters are distinguished from ecological problems on the basis of their sudden and crisis generating nature. While we look at ecological problems in the last part of the paper, most of our observations are about disasters.

We next indicate how popular thinking, much disaster planning and some hazard research has tended to conceive of sudden type disasters in agent specific terms, that is, as hurricanes, chemical explosions, earthquakes, radiation fallouts, etc. We question the value of such an approach with its emphasis on physical features of an event, and also challenge the frequently advanced distinctions drawn between so-called "Acts of God"/natural disasters, and technological/human created disasters. Instead the usefulness of thinking of disasters in generic or general rather than agent specific terms is suggested; in particular the value of conceiving of disasters as social phenomena is stressed. We especially note how a generic approach which views disasters as social occasions rather than physical happenings has important implications for the preparing for and managing of such social occurrences.

In the third part of the paper we point out that while common sense and traditional views of different disaster types are not useful for planning and managing purposes, disasters do differ along certain socially relevant dimensions. Although there does not exist a complete typology or taxonomy at this time, we do discuss eight important dimensions along which disasters can significantly differ. These include four characteristics of impacted communities and four characteristics of impacted populations. In the course of this discussion, some additional implications for emergency time

disaster planning and managing purposes are brought forward. Next we briefly examine whether our generic approach is equally applicable to different phases or stages of disaster planning. In general, we argue that a generic and a social dimensional approach to disasters is especially valid for dealing with emergency preparedness and response activities. And while more of a case for an agent specific approach can be made be made for some aspects of planning for mitigating and recovering from disasters, a generic approach also seems generally valid for these phases too.

In the fifth and concluding part of the paper, we consider the nature of ecological problems. While in some ways, their sources and outcomes are similar to natural and technological disasters, they are nonetheless fundamentally different. They differ not only in origin and career, but also in effects. As such they do require different kinds of planning and managing than do the more sudden natural and technological types of disasters discussed earlier in the paper.

The letter inviting me to this colloquium suggested that I talk about technological disasters and ecological problems from the viewpoint of someone who has undertaken research on such matters for the last 35 years. Given that, you should know the following.

My perspective is that of a social scientist generally and a sociologist in particular. Thus, my comments are mostly about the human and social aspects of the phenomena that is our central concern. More specifically, I shall be dealing with the most appropriate kind of planning for and managing of technological and natural disasters and ecological problems.

In addition, my remarks are mostly directed towards answering one general question. It has to do with what can be meaningfully put together and what must be treated separately for planning and managing purposes. This question stems from the following observations.

The Question

As we look around the world in the last few years, we can see numerous occasions where many people have been killed and injured, and/or where there was much property destruction and damage, and which generally resulted in negative effects for human beings and the communities wherein they lived.

Some of these occasions were rather dramatic and their very names are quite familiar; for example, the Chernobyl nuclear accident and its radiation fallout, Hurricane Andrew that last year devastated southern Florida, the chemical poisoning at Bhopal in India or the one near Seveso in Italy, the Los Angeles racial riots, the Loma Prieta and the Armenian earthquakes, the Exxon Valdez oil spill, the Mt. St. Helens volcanic eruption, the floods in Bangladesh that put 70 percent of the country under water, the famine in Somalia, and ethnic strife in Bosnia, the Sudan, Iraq as well as in former republics of the Soviet Union.

Some other negatively producing happenings were perhaps less dramatic but actually occurred more often if not on a chronic basis, those problems often called ecological or environmental. For example, in many metropolitan areas around the world there have been frequent episodes of air pollution, as has occurred on and off in Los Angeles and Mexico City. Then there has been the contamination through sewerage and dumping of hazardous materials in many lakes, rivers and in coastal areas; the drinking water of Milwaukee, Wisconsin was recently threatened by such a happening. Also, there have been damages and losses emanating from hazardous waste sites where the perilous substances have ranged from toxic chemicals to radiated nuclear residues. In all these instances while the hazardous end products were related to a technological process, their appearance were the result of human actions.

Do the variety of these happenings which we have just illustrated or mentioned, do they share enough in common to justify treating them as a relatively similar phenomena? They certainly all produced highly negative effects for the people involved and their communities. But can natural disasters, riots, technological disasters and ecological problems be treated simply as variants of a basic phenomena? There are some who argue for such an approach. They say that all such collective stress situations share enough in common, to allow for the derivation from research on them of some general planning and managing principles. Differences are not denied, but their view is that the human and social similarities are far more important than such dissimilarities in behaviors as do exist.

Let us put the question in more local terms. For example, to what extent are we justified in treating the Mexico City earthquake of 1985 as a social occasion that was fundamentally similar or different from the explosions in Guadalajara last year? What about the similarities and differences in individual and organizational behaviors between what happened in the 1982 El Chichonal volcanic eruption and the 1984 chemical disaster in San Juan Ixhuatepec outside of Mexico City? (Or extending our question, can the civil disturbances involving students and others that have occurred in this capital city be meaningfully thought of in the same way as the happenings just mentioned?).

Or put in more general terms, are there significant differences for planning and managing purposes between the earthquake and the explosions, between the chemical disaster and the volcanic eruption? (And between them and the riot situations?) Or are there enough similarities between the four occasions that allow disaster planners and emergency managers to treat them as roughly equivalent community crises?

Crises and Non-Crisis Situations

To answer this general question we will initially indicate what we mean by community crises and then briefly distinguish two different major types of such crises, namely disasters/catastrophes, and conflict ones such as riots and civil disturbances. There are both similarities and differences in the characteristics of the two types that have to be taken into account in planning and managing such situations at the community level. But we shall be primarily indicating that the differences in these particular cases are more important than the similarities.

This view is not a matter of personal preference or simply opinion. Rather it is drawn from an extensive body of research studies on disasters and riots that have been undertaken in the last four decades. Hundreds and hundreds of such social occasions have been very intensively examined, often by on-the-scene teams of researchers (e.g., the Disaster Research Center along has done

field studies of over 525 different kinds of mass emergencies, particularly at the community level). However, while particular studies are cited for some of our assertions, most of our observations are drawn from general summaries of the literature (e.g. Barton, 1970; Perry and Pugh, 1978; Miller, 1985; Drabek, 1986; Dynes, De Marchi and Pelanda, 1987; Quarantelli, 1988 and 1993; Kreps, 1989; Auf der Heide, 1989; Drabek and Hoetmer, 1991).

All crises by definition share three common and interrelated characteristics: there is a threat of some kind, it is relatively unexpected, and there is an urgency or a need to act.

In a crisis, there is a danger or hazard of some kind. In many instances this will involve a perceived threat to life and/or property. At the very least, something which is value by involved persons is considered at risk.

Also, the situation is relatively unexpected when the occasion occurs. There may be some prior indications of danger ahead of time, such as warnings for hurricanes. But overall the specific instance comes up rather quickly and in a nonroutine way.

In a crisis, furthermore, there basically is a need to react for the effects are likely to be even more negative if nothing is done. That is, there will be more casualties, and/or destruction and damage, and/or social disruptions, and/or costs of all kinds from the economic to the psychological to the ecological, if no remedial actions are taken. Therefore, established authorities at least attempt to take steps to try and restore normal routines.

We should note that not all kinds of situations which involve threat or danger need necessitate immediate actions. There are hazardous situations where a delay in response of hours or days and even longer, will not be significant. These typically are where there is considerable lead time before the risk will manifest itself in its most dangerous form. Examples would be instances such as the slow chemical poisonings as might be occasioned by asbestos, radiation contamination by radon, climatological pollution through acid rain, some health epidemics, coastal erosion and land subsidence, and all but the last stages of famines and droughts (as well as a variety of potential conflict situations). Put another way, these kinds of threat situations do not create a crisis situation (as we defined crisis earlier).

Slow on-set risks pose both theoretical and methodological research problems as well as practical issues of planning and managing not encountered in quick on-set dangers (see Quarantelli, 1987). Given these differences, in this paper we primarily and first discuss only sudden type crises that significantly affect a community (there are some transportation accidents which while happening in particular localities may not actually disrupt community life as can be seen in the instance of a plane crash in an uninhabited area

near an airport--while disasters, these instances are not necessarily community disasters). At the end of the paper we consider ecological problems which for the most part do not suddenly and unexpectedly appear, and which generally do not create a crisis.

Different Types of Crises

As previously indicated, while all community crises by definition share some common aspects, there are different major types of crises. Thus, many researchers frequently make a major distinction between:

> consensus type crises--
> under which natural and technological disasters and catastrophes are included, and
>
> conflict type crises--
> under which riots and civil strife disturbances are included.

The typology is not important in itself. Instead it is that the emergency time context for organizational activity in the two types of crises can be rather different.

As an example, the delivery of emergency medical services and the functioning of hospitals differ markedly in disasters and riots. The flow of patients to hospitals in disasters tends to build up quickly, peaks and then drops off quickly with the more seriously injured arriving after the less seriously injured. In riots instead, there is no such clear pattern; there may be several peaks, the flow can be rather erratic, and the severity of the arriving injured is not related to the time period. Furthermore during disasters, hospitals typically can use personnel from all three work shifts during the height of the emergency; in riots, they frequently are forced to operate with only the staff members who are present at work when the crisis develops. This is related to the fact that in riots, the violence in the streets and curfews prevents a convergence of hospital workers to their work places. Also, in riots, the conflict can spill over into the hospital setting requiring security measures (including handcuffing of patients or their physical guarding) which simply are not necessary actions in disasters. In fact, during a riot a medical facility can come under attack at different times, an unknown danger in a disaster.

These are but illustrations with respect to one kind of typical problem in a crisis, namely the delivery of emergency medical services by hospitals. The behavioral differences between consensus type crisis such as disasters and conflict type crises, is something that has to be taken into account. As earlier indicated, this does not mean that they do not share some common

elements which allow similar kinds of planning and managing. Rather the point is that there are significant differences that also have to be taken into account by those interested in community crises.

Let us look at the two major types a little more systematically.

Consensus type crises are best exemplified by disasters and catastrophes. Generally, the majority of disaster researchers have dealt with the human and social aspects associated with natural hazardous agents (such as hurricanes, floods, volcanic eruptions, tornadoes, earthquakes, and tsunami), and with risk producing technological agents (such as explosions, fires, chemical and nuclear plant accidents, electric and energy system failures, biological poisonings, and large scale transportation wrecks and structural collapses). The events associated with the above occasions are all relatively sudden in appearance and generally have a fairly definable locale or area of impact. Most important, they are also characterized at the time of impact by widespread consensus on terminating the crises as soon as possible, although there may be disagreements on the means to be used for that purpose.

This contrasts sharply with the conflict types of occasions. In these one or more parties in the situation are consciously and deliberately trying to inflict damage, destruction and/or disruption on some of the involved populations. The intent often is to prolong the crises until one side or the other wins the struggle or is successful in attaining its objectives. We have in mind such social occasions as wars, riots and civil disturbances, collective terrorist attacks and hostage takings, product tampering and sabotage by groups, and ethnic cleansing and massacres. In disasters there may be disagreements but it is not the conscious and deliberative intent of any of the parties involved to prolong the crisis. In addition, as a whole, disasters tend to be relatively localized in time and space, whereas the conflict type behaviors tend to be more diffuse in time and space. We as well as others do see conflict occasions as one kind of collective stress situation, and as such there are certain elements shared with disasters, but nonetheless the differences are far more important than the similarities.

Given this, the planning for and managing of conflict situations differs in important ways than what is required in consensus occasions. As such we now turn to a discussion of disasters.

Disasters as Generic Phenomena

The conception of disaster, especially the attributed source of disasters has changed over time. For most of history it was traditional to view certain sudden and extraordinary physical disturbances with marked negative effects as "Acts of God". Whether

it was volcanic eruptions, earthquakes, floods, or tsunamis, the source of the disaster agent was placed in the supernatural domain. In more recent times, and with the spread of more secular and non-religious ideologies, there was a shift to the term "natural" disaster, substituting nature for the supernatural. So earthquakes are the result of plate dynamics, or floods the consequences of rainfall and drainage capabilities. But in either case, the imagery was that something external and beyond the control of the human victims was responsible for whatever negative happened.

However, in recent decades it has become progressively impossible to attribute all responsibility to God or nature, so the notion of human created disasters has more and more been advanced. This was first stated with respect to the realm of technological accidents. So, to the Acts of God (or Nature) have been added Acts of Men and Women (or Society).

However, one consequence of this seeking for source or origin of the phenomena is a tendency to approach planning for disasters in agent specific terms. Thus, in many places in the world, much disaster planning for disasters tends to be agent-specific. There is a tendency to organize separate and distinctive planning around specific disaster agents. Thus, there often are separate plans for disasters resulting from hazardous chemicals, separate plans for hurricane threats, separate plans for emergencies in nuclear plants, separate plans for flood threats, and so on. Planning is often separated with usually different organizations for preparing and responding to the separately viewed threats or impacts.

This kind of separate agent specific orientation might seem natural and obvious. It certainly fits in with popular thinking about disasters. Are not chemical threats different from earthquakes? Are not floods different from massive fires in high rise buildings? The answer of course is yes. But the yes is in an important sense to the wrong question.

Thus, increasingly there has been a shift by disaster researchers in the last decade to an all hazards or more generic approach. It is true that disaster and especially hazard researchers at one time approached the matter in the same way as many current emergency planners. In the very earliest days of social science hazard and disaster studies four decades ago, the majority of researchers were inclined to accept as relevant for planning purposes the typical everyday distinctions drawn between a variety of different kinds of disaster agents (e.g., floods, explosions, hurricanes, fires, etc.). Soon the more particular distinctions tended to be collapsed into two general categories: natural disasters (so called "Acts of God") and technological ones (those supposedly brought about by human actions). However, more recently and increasingly the value of these kinds of surface or manifest distinctions has been doubted and the matter has became part of the larger question of a generic versus an agent specific approach to disasters.

The agent specific approach assumes that each type of hazardous agent (e.g. a volcanic eruption, a nuclear radiation fallout) or classes of agents (e.g., the source being in the natural or in the technological sphere) have certain distinctive characteristics that have consequences for what occurs. The generic approach assumes that there are more individual and organizational behavioral similarities than differences across all disaster occasions. Currently, most social scientists interested in disaster research do not use a typology of different agents or classes of physical agents but take a generic approach to the problem.

There are two general reasons for this shift to a generic approach. One is theoretical. The other--more important--is empirical.

From a theoretical point of view there has been a shift away from a focus on the physical aspects involved towards a more social conception of disasters. This has partly resulted from a logical recognition that, for example, the occurrence of an earthquake or a chemical explosion per se does not automatically result in a "disaster." Thus, a natural land movement of a certain kind is an earthquake and the transformation of an inert liquid into an expansive gas is a chemical explosion. But unless there are significant social negative consequences of some kind, such happenings remain only a geophysical event or a chemical process (e.g., an earthquake in uninhabited land or a chemical explosion caught within a safety container). From this perspective, a disaster can be identified only in terms of some features of a social occasion, that is, some characteristics of the individuals and groups reacting in the situation, The socially oriented conception of a disaster forces a focus on the common or similar properties of the social happening and away from the physical features of natural and technological agents and impacts.

Even more critically crucial regarding the issue is that cumulative social science studies have found that most sociobehavioral features of disasters are not agent or class agent specific, but are generally manifested across many different types of hazardous natural and technological agents. For very many of the human and organizational problems in preparing for and managing the response to disasters, the specific kind of agent which might be involved in the disaster does not matter. Whether the emergency time disaster task be warning, evacuation, sheltering, feeding, search and rescue, disposition of the dead, mobilization of resources, communication flow, interorganizational coordination, public information, etc., and whether the tasks involve individuals or groups, the same general activities have to be undertaken irrespective of the specific agent in the situation.

For example, the same kind of warning messages and the same kind of warning system is needed and effective in getting people to evacuate, irrespective of the specific agent involved. It does not matter if the agent is a tornado, an oil spill, a tsunami, or a

major fire in an hazardous waste site--what will motivate people to give credence to warning messages, what kinds of warning messages will be effective, what will limit the acceptance of a warning, and so on, will be the same in all cases. These human aspects of a disaster do not depend on the specific type of agent involved.

Similarly, if organized search and rescue or the large-scale delivery of emergency medical services occurs after a disaster impact, the more important organizational aspects that have to be dealt with do not depend on the specific agent in the situation. For example, research has consistently shown that the less seriously injured are likely to be treated first, that one or a few hospitals will take a disproportionate number of the injured victims, that there will be no overall coordination of the medical-health response. Likewise, studies have concluded that ordinary citizens in impacted localities will quickly undertake the initial search and rescue, that formal search and rescue teams tend to operate in an unintegrated way, and that the handling of dead bodies is very psychologically disturbing. The specific agent involved does not matter in the carrying out of emergency tasks.

The same is true when general classes or categories of agents are contrasted. For example, in a disaster preparedness primer, certain differences are noted in a discussion of the similarities and of the differences between community planning for natural hazards and chemicals hazards. But it is then observed that:

> these differences do not necessarily rule out the application of principles of natural disaster planning to problems of chemical hazards. In fact...studies on natural disaster planning and response can be of value for persons connected with chemical disaster preparedness.

It is then stated:

> regardless of the characteristics of a particular disaster agent and the specific demands generated by it, the same kinds of community response-related tasks are necessary in both kinds of disasters and for all disaster phases. In any community, for example, the assessment of hazards and the aggregation of disaster-relevant resources necessary, regardless of the specific hazards and resources in question. Similarly, post-impact communication and decision-making procedures must be planned for and activated in <u>any</u> community crisis.

Then it is noted:

> To draw an analogy, a battle on land is fought with different weapons, material, personnel and support systems than those used in sea battles, but, nevertheless, the general overall battle requirements are the same for both. In both cases, intelligence about enemy strength and movements must be gathered, resources must be collected, trained personnel must be led effectively, and so on. The same is true for disaster planning: although disaster agents and the human and material resources needed to respond to them may vary, the same generic kinds of activities must be performed in the predisaster, preimpact, response, and recovery periods, regardless of the specific threat (Tierney, 1980: 18-19).

A similar questioning of a technological versus natural disaster distinction has particularly accelerated in the last decade (see, e.g., researchers such as Bolton, 1986 who notes many similarities between natural hazards and industrial crises in developed countries, and operational personnel such as Wijkman and Timberlake, 1984, who indicate the very title of their volume, Acts of God or Acts of Man?, is not a meaningful distinction in developing societies). Towfighi states:

> Does it make sense to combine planning for natural and technological disasters?...both types of disaster require certain similar measures for preparedness, emergency response, and postdisaster periods. Early warning systems can be used for both natural and technological disasters, for example. And both require institutional response capabilities, logistical preparedness, community education and training, vulnerability and risk assessment, site evaluations, communications networks, and plans, procedures, and hazard control mechanisms (1991:107).

This kind of position is supported by researchers who have looked at particular behaviors such as evacuation and noted similarities in volcanic eruptions, floods and nuclear power plant accidents. Even when social aspects seem somewhat agent specific, closer examination frequently indicates that the linkage is often of a broader nature. For example, the concept of "disaster subculture" was linked initially to a specific agent, such as a flood subculture or a hurricane subculture. The reference is to the development of adjustive mechanisms at both the individual and organizational level as a result of repeated exposures to the same kind of disaster. There is now reason to believe the nature of the experience and other situational factors are more important in the development of adjustive subcultures than the characteristics of

the specific agent.

Some have even argued that such activities as earthquake predictions are not that agent specific. Thus, Turner (1980) implies that much of what researchers know about how people respond to threats and warnings for other dangerous possibilities is equally applicable to prediction scenarios for earthquakes.

Finally, researchers who argue for a generic approach question in many cases whether any concrete agents can be identified in certain disasters and also if agents can always be easily classified. Thus, what is the agent in a famine or drought? Are the sources of forest and brush fires or of avalanches and landslides to be found in human actions or natural phenomena? What of physical fatigue in bridges or pipelines which result in structural collapse or nondeliberately contaminated food or medical products--what is the source of what might turn into a disaster? Plane crashes, as well as many other transportation accidents, can be generated by both natural and technological agents.

One consequence of this kind of thinking is that some researchers have been developing definitions of disasters that make no reference whatsoever to any agent involved; for example, Dynes recently has defined a disaster as:

> a normatively defined occasion in a community when extraordinary efforts are taken to protect and benefit some social resource whose existence is perceived as threatened.

He then goes on to note several implications of such a formulation.

> There are no references to disaster agents. It suggests that all disasters are socially caused and that traditional distinctions, God/man, technological/ "natural" are less statements of scientific causation than they are remnants of previous normative arguments whose proponents still think represent statements of truth. It also suggests that yesterday's inattention may be a disaster today. It means that what might be defined as a disaster in one country or community might not be defined in another. It also suggests that the same"agent" will have quite different consequences in what are seemingly equivalent communities (Dynes, 1989: 8).

The generic approach is not only advocated by social science disaster researchers. When the United States Congress was considering the Implementation Plan required by the Earthquake Hazards Reduction Act of 1977, the Office of Technology Assessment

was asked to develop "Criteria for Evaluating the Earthquake Mitigation Implementation Plan." A summary of the report which discussed the criteria said a major issue was "earthquake versus an all natural hazards strategy." With respect to this matter, the report concluded that:

> While it may be convenient for researchers and the large Federal agencies to handle hazards categorically, the practicalities of State and local government organization and function increasingly required integrated planning and operations for all hazards. Similarly, federal construction and housing programs also could be responsive to all hazards, not just to one or a few selected hazards (Quoted in The Hazard Monthly, July, 1980, p. 3).

At times when the polarity of approach is raised and discussed, a statement is made to the effect that, yes there is a difference in approach possible, but the division is an operational versus an academic one. Thus it is argued that field operational personnel faced with dealing with an immediate emergency situation need agent specific knowledge. For example, how far do people have to be evacuated to avoid the toxicity or flying debris if a tanker of chlorine is threatening to explode? On the other hand, it is said that those with more academic concerns can afford to deal with the more generic questions. What, for instance, are the general factors which motivate people to evacuate?

This operational-academic distinction is not a valid one. It seems to confuse tactical matters (e.g., the distance to evacuate), which would vary in any situation involving either similar of dissimilar disaster agents, with strategic matters (e.g., general principles of motivation applicable to all situations). There are strategies for dealing with disasters which cut across disasters; the tactics may be more situationally specific, although even the military from where the strategy-tactics distinction is drawn seems to feel that solders can be taught tactical principles that apply in all or most combat situations.

We can also noted that such a practical and applied field as medicine proceeds as if planning and responses in disasters need not be agent specific. It is extremely rare to find disaster medical personnel training and preparing for only one kind of medical treatment. Disasters are viewed generally (e.g., the World Health Organization defines a disaster as "a situation which implies unforeseen, serious and immediate threats to public health" (LeChat, 1980: 18), and disaster medicine emphasizes general principles and organizationally focus is on personnel alerting systems, triage, allocation of patients to hospitals, and other non-specific disaster aspects.

It sometimes may appear that a generic approach to disasters combines rather dissimilar kinds of physical agents or other heterogeneous elements and otherwise violates common sense. In one way, this is correct, but it is not necessarily significant. An analogy may make this point better than a direct discussion. Biologists have long classified whales, bats, and human beings as mammals. There are many manifest differences in sizes, structures and functions of these three creatures; however, for purposes of biological study and application, these obvious common sense differences are far less significant than less overt structural and functional similarities, such as the fact that all mammals are warm-blooded and bear their young alive. For purposes of biological study and application of biological principles, the physical size of a whale compared with a bat, or the fact that the former needs a water environment where human beings basically need a land environment, are unimportant.

Putting together manifestly different physical agents or overtly different disaster-related elements can be viewed similarly. In fact, it has been suggested that disaster researchers should follow the lead of biologists who draw a distinction between phenotypes and genotypes (Quarantelli, 1987: 27). Instead of focusing on surface and manifest phenotypical features, instead attention should be on similar underlying or genotypical characteristics.

The generic or all hazards approach is not necessarily easily acceptable nor easily instituted in actual planning practices. There are a number of reasons for this. There is a historical reason. Much early work on disasters initially focused on the physical agent involved, and to some this became an habitual and traditional way of approaching the problem. Thus, for example, there are specialists on flood control or hurricane prediction problems. In more recent times, a similar reluctance to moving away from an agent specific orientation can be observed in the fire research and the nuclear risk areas. Researchers and operational people in those two areas have long struggled with questions as to the physical agents involved and the agent specific characteristics of the agent. Accustomed to thinking in that way, they have difficulty in seeing that sociobehavioral studies of other disaster situations have direct applicability to their own areas. They reflect well a famous statement by Kenneth Burke that, "a way of seeing is also a way of not seeing" (quoted in Lindesmith and Strauss, 1949: 101).

Even recognizing that there may be a more valid approach than an agent specific perspective is handicapped by the fact that many interested in disaster problems have difficulty in communicating because they live in relatively different professional and intellectual research worlds. Some of these persons are specialists and knowledgeable in depth about one kind of agent such as fires, earthquakes, nuclear hazards, or landslides. Others are specialists and knowledgeable in depth about topics and questions

that cut across various kinds of disasters, and thus may primarily think in such topical terms as warning, search and rescue, medical treatment and handling of the dead. In a sense, some divide the disaster world horizontally; others divide it vertically. This separation does not facilitate communication from one axis to another. Furthermore, it is probably more difficult for vertical communicators (agent specific specialists) to understand horizontal communicators (general disaster specialists) than vice versa. The former, for example, a seismologist, is likely to have a narrower perspective than the latter, for example, a sociologist.

We would not deny that it is possible to draw valid distinctions for certain limited scientific research goals between different kinds of hazards. As someone recently wrote:

> I believe we have not been able, until now, to differentiate fully between a <u>hazard</u> (i.e., the natural phenomenon itself and a <u>disaster</u> (i.e., its impact on a given community. A disaster is simply the result of the negative impact of one particular hazard on one given community; it is a measure of the vulnerability of this community to a specific hazard (Boulle, 1990: 4)

Clearly the physical factors which, for example, generate earthquakes are different from those involved in creating hurricanes. But we would say that for most purposes, including those of prevention and mitigation, the distinction often drawn among Acts of God (or Nature) and between them and Acts of Society is both a useless and false one. It implies not only dubious notions of causality, but more important, the equally questionable idea that as a whole certain kinds of disasters are fundamentally different in origin and consequences from other kinds of disasters. Thus, in one case, nature or God is blamed. In another case, the responsibility for the happening is assigned to human beings, as say in the case of a nuclear plant accident such as Chernobyl or a poison gas cloud spread as in Bhopal. There also lurks in the distinction a supposition that one kind of disaster is more directly controllable than the other (an old idea that contrary to what is implied in some recent writings can be found in the musings of ancient Greek philosophers).

In actual fact, all disasters are always primarily the results of human actions. A disaster is not a physical happening; it is a social occasion. Thus, is it is misnomer to talk about <u>natural</u> disasters as if they could exist outside of the actions and decisions of human beings and societies. For instance, floods, earthquakes, volcanic eruptions, tsunamis and other so-called "natural" disaster agents have social consequences <u>only</u> as a result of the pre-, trans, and post-impact activities of individuals and communities. For example, allowing high density population

concentrations in flood plains, having poor or unenforced earthquake building codes for structures, delaying evacuation from volcanic slopes, providing inadequate information or warnings about tsunamis, are far more important than the disaster agent itself in creating the casualties, property and economic losses, psychological stresses, and disruptions of everyday routines that are the essence of disasters.

In one sense, there never is a natural disaster; at most, there is a conjuncture of certain physical happenings and certain social happenings. Without the latter, the former, i.e., the so called 'triggering events" have no social significance (Wijkman and Timberlake, 1984). In fact, a physical triggering event can be totally absent and there can still be a disaster in the social sense as can be seen in the behavioral responses to threats or false alarms of tsunamis or floods. There can be evacuation and disruption of community life. The forests that burned in past eons were not disasters in that had no social consequences; only those that have the latter today are disasters. This line of reasoning is that we should think of all disasters, natural agent based or otherwise, as social occasions.

Now there are at least five major implications of rethinking of disasters as social and not natural or technological happenings.

For one, there is an implication that prevention and mitigation must stress social rather than physical solutions. If disasters are in one sense the manifestations of social vulnerabilities of social systems, then prime attention must be given to doing something about such vulnerabilities. Thus, if a population lives near an active volcano or in unreinforced building structures--and these are always the consequences of human actions and social decisions--preventing and mitigating activities such as community relocation and upgrading building practices and codes become the measures which should be primarily considered. In other words, it is attitudes and behaviors which in the main have to be changed. Problems of a social nature require solutions of a social nature.

Also, an emphasis on disasters as social happenings highlights the narrowness and limits of thinking that many aspects of disaster planning are mostly matters of implementation of technology which primarily involves "technical" decisions. Recently, one writer illustrated the point in the following way:

> Many engineers claim that decisions about where to locate dams are purely technical. But the U.S. has sustained about a century of political fights on where dams are to be sited, attesting to the fact that wide range of values held by diverse constituencies are affected by such purely technical" decisions.

> ...Much of the water pollution in this country can be attributed to early twentieth century engineering beliefs, when engineers argued for clearing up cities by dumping wastes into rivers (dilution is the solution to pollution). The objections of public health physicians that this practice would contaminate the water supplies of communities living further downstream were dismissed with another engineering solution--filtration and treatment of domestic water at the intake point! (Love, 1990: 8)

Although writing of the United States, her observations stress the notion that many technological elements in disaster planning make not always easily recognize assumptions about the nature of human behavior.

Furthermore, emphasis on the social rather than physical nature of disasters implies a <u>proactive</u> rather than just a reactive stance. That is, instead of waiting for the disaster to occur, encouragement is given to the idea of taking relevant actions before occurrence. If the phenomena is thought of as basically material or physical, it is sometimes very difficult to see what could be done to the disaster agent such as an earthquake or tornado before impact. On the other hand, if the point of view is that the phenomena primarily results from social factors, encouragement is given to taking preimpact measures. It may not be possible to prevent the land from shaking, but is possible through laws not to allow chemical or nuclear plants to be built on or very near to earthquake faults or soil that will easily liquify, or to discourage farming practices that will dilute the land and contribute to drought conditions. As the sharply differentiated consequences from the Armenian and Loma Prieta earthquakes recently showed, with far more negative effects in the Soviet Union than in the United States (e.g., a 6.9 Richter scale earthquake in the former killed approximately 25,000, injured more than 31,000 and left 514,000 homeless, whereas a 7.1 Richter scale earthquake in the latter killed only 62, injured 3,757 and left only about 12,000 homeless) the casualties and property damage incurred will be more a function of preimpact building codes, construction practices, legal requirements and social expectations, rather than how much the land will shake at the time of impact.

Another value of thinking of disasters a social rather than physical happenings, is that emphasis comes to be on internal rather than external factors. A disaster in this view is not an outside force that impacts upon a social system, but a manifestation of internal flaws and weaknesses in the society. thus, the threat is not vaguely "out there" as a hurricane, but resides specifically within the social system. To paraphrase a widespread slogan of many citizen participation movements of the

1970s, "we have met the enemy, and it is us." As such, in one sense, it becomes easier to visualize where to start to address the problem of coping with disasters. As Sapir and Lechat have written about drought and famine disasters:

> Two of the largest famines since World War II have been in countries with a normal or more than normal food production during the famine year...Ethiopia was a net exporter of food in 1973, and both Bangladesh and Bengal produced more grain in 1974 and 1941 respectively than in the preceding years...Drought sometimes serves as a trigger mechanism for a famine, but the disaster remains a largely poverty-related catastrophe with a very weak causal relationship to food supply. Similarly, the impact of other disasters is a function of the physical and economic resistance of the population (1986: 124).

Finally, the view of disasters as social phenomena allows them to be more readily seen as something which can be reacted to as part of ongoing policies and programs of national or social development, which could reduce societal vulnerabilities in the first place. Activities of disaster prevention and mitigation then can be seen as an integral part of development and planning, whether this be of a metropolitan area in an urbanized society or of farming areas in developing societies. A focus on the social nature of disasters makes it much easier to plan simultaneously both for community planning and societal development, and disasters. This link between the two activities is explicitly argued by those who say that disasters are indicators of the failure of development, and that development can part of the process of reducing vulnerabilities to disasters.

Different Disaster Dimensions

Now the generic approach currently in favor does <u>not</u> deny that there are important differences between disaster occasions, only that they are not specific agent linked. For example, in some cases warning is possible and in others it is impossible or very difficult, and in other instances impact is very diffuse whereas in others the impact is very focused and localized. As many have said, what is important is not the physical difference between an explosion or an earthquake, but the fact that neither, for example, usually allow time for warning.

Or as others have written: "a flash flood resulting from a broken dam might have more similarity to a sudden tornado than to a slowly rising...river flood (Stoddard 1968: 12); "a flood... for which there may be two weeks warnings, is simply not a comparable event to a flood...with six hours warning, or to one...where warnings

were received as flood waters entered dwellings" (Mileti et al, 1975: 5); or "the differences between damaging events due to the same natural or man-made agent may be larger than between events initiated by a different agent" (Hewitt and Burton, 1971: 124). Obviously such approaches or perspectives cut across different agents and suggest looking at different dimensions of the social setting in which the disaster occurs.

If we could develop systematic disaster typologies based on some combinations of meaningful dimensions of social occasions, we could better grasp the commonality of sociobehavioral phenomena across different agents and differences within the same agent. In line with this view it has been suggested that typologies of disasters should combine such generic social dimensions as predictability, relative loss impact, recurrence, unfamiliarity, rapidity of onset, length of threat, inclusiveness of involvement and the social centrality of the affected population (Quarantelli, 1985: 58). As we shall note later, all of them can be conceptualized as characteristics of the social occasion rather than of the physical agent in the disaster.

These dimensions not only cut across different disaster agents (whether natural or technological) but also the same disaster agent (e.g., a flood or a chemical explosion). For instance, the same kind of chemical explosion may be seen as a familiar threat in localities around chemical complexes but unfamiliar in other communities; the degree of familiarity will affect responses to warnings, the probability of evacuation, and expectations about emergency organizational behavior.

Unfortunately no such typology exists. Or more accurately there is none that has won any wide acceptance in the disaster research community.

However, in the last decade particular dimensions have increasingly been singled out as being important for developing a typology within a generic approach. We will therefore discuss as they have been noted in the research literature, eight major dimensions or characteristics of the social response in a disaster occasion. Given our general conceptualization of disaster, the emphasis is on <u>characteristics of the occasion</u> rather than any dimension of a physical agent (even if there is one which is not always the case as, for example, in the instance of famine).

The social response can be divided into two categories. There is the response of the affected community, the locality involved. We will note four characteristics of such communities. Then there is the response of the affected population, the people involved We will note four characteristics of such populations, the individuals and organizational officials involved (and these are analytically different from community characteristics, although we can not develop this point here).

The affected communities.

1. The relative proportion of the community population involved.

The proportion of the population involved relative to some base is far more important for planning purposes than absolute numbers. This is true whether the focus is on concrete losses or on psychological involvement. For example, 500 dead in a metropolitan area of five million involves relatively far less of the community than does 100 in a small town of 1,000 inhabitants. There can be a similar situation in terms of the amount of property damage or destruction. The same absolute numbers might mean a catastrophe in some communities but only a bigger than usual emergency in others. In more general terms, this disaster occasion characteristic has less to do with geographic scope or the physical scope of impact than with the social scope of the disaster occasion. The degree of community involvement has to be identified in social terms relative to the total population or resource base.

From an organizational point of view there are several important implications, the greater the relative proportion of the population involved. For one, the greater the relative involvement, the more the occasion will be a disaster rather than just an emergency. Put another way, as increasingly has been argued a disaster is both quantatively and qualitatively different from an everyday emergency and necessitates different kinds of planning. A Bhopal gas poisoning incident involving thousands of households is not merely one end of a scale with a gas leak in a house at the other end.

Along another line, the huge, urban complexes that are coming into being in many developing societies--contrary to widespread belief--are far more likely to generate a tremendous acceleration of everyday emergencies rather than disasters. But in such situations when a disaster occurs it is likely to be of a catastrophic nature (see our discussion in the last section of this paper on the difference between a "disaster" and a "catastrophe" and some planning implications of the distinction). The tip point for a disaster is much higher when viewed relatively than it is in absolute numbers (e.g., handling 250 dead a day may be the normal statistic in a metropolitan area). Institutional disaster planning has to take this into account.

2. The social centrality of the affected population.

Also, important for planning purposes, is whether the affected population is central or peripheral to the larger social community. That is, the victims may be from the area or they may not identify very much with the impacted locality. Thus, the occasion of one disaster may involve a rather different population mix than another, even with an identical disaster agent in the same community (e.g., if a tornado were to hit a crowded airport terminal at one time and a large but local social event at another;

making victims respectively of many transients and many of long time closely linked neighborhood residents).

Organizationally, the more mixed the population affected the more likely there will be problems; everything else being equal homogeneous populations present less planning problems. In developing societies, for example, there will be major situational differences between areas populated at certain times of the year with many temporary migrant workers and other localities that are generally populated only by a stable native population. Disaster planning to be effective would have to be rather different for these two kinds of situations where the affected populations differ in their social centrality. This would be true even if both disaster occasions happened within the same society.

Related to this are disasters that occur in but not to a given community. Most transportation accident generated disasters (such as those resulting from plane crashes and train derailments) are of this kind. The surviving passengers and crew members usually have no social ties to the residents of the community wherein the happening occurs. This has important consequences for survivors, for example, in that they generally lack the social support that victims of community disasters typically have. In non-community type disasters also, responding local organizations will have more problems coping with certain standard problems in the emergency period, such as the identification of casualties, notifying relatives, handling inquiries about the dead and injured, etc.

3. The time and space of community involvement.

In some disaster occasions, the community will become slowly involved in the crisis. On the other hand, there may be sudden and very rapid involvement. Some flash flood disasters, many dangerous chemical emergencies resulting from transportation accidents, and most earthquakes, as well as the Seveso, Italy dioxin threat and even the circulation of a false story of a dam collapse, are studied examples of the kinds of occasions where a community is suddenly confronted by a disaster. In contrast, most riverine floods, the occasional predicted earthquake (scientific or otherwise as in the recent New Madrid case), and practically all famines, usually only slowly envelope communities, as did the Three Mile Island nuclear plant accident and the dangerous chemical threat at Love Canal.

The slowness or rapidity of the response is crucial in what may and can be done. While this dimension is sometimes related to predictability, it is nonetheless independent of it. Predictability has to do with expectedness, rapidity with speed; the two can vary independently. Also, we treat rapidity of involvement as a characteristic of the disaster occasion; it is not equated with speed of onset, which is a feature of some physical disaster agents. Rapidity refers to what happens in the response

pattern and is viewed from the perspective of the community involved; thus it may or may not correspond with the "actual" time available for action (as seen if a comparison is made between the perceived hazardous chemical crisis at Love Canal and Seveso, Italy). This obviously can create planning difficulties. Generally adjustment is best to slow involvement situations; in some cases there may not even be much of a crisis. Adjustment is much more difficult in rapid involvement occasions. The matter is often compounded in some developing countries where, as we and others have discussed elsewhere, conceptions of social time may differ between more Western oriented emergency groups and the indigenous population in an area.

While we have mostly focused on the temporal aspects of this dimension, there is often a spatial component too. At times, a disaster occasion is very localized, perhaps even in just a building or a spatially delimited area. At other times, disasters are very geographically diffused. Organizations such as police and fire departments have more difficulty in mobilizing and responding to the latter type of social occasions. The Incident Command System (ICS), among its many problems (see Wenger, Quarantelli and Dynes, 1990) is difficult to implement in both focused disasters (it tends to lead to an organizational overresponse) and diffused disasters (it becomes impossible to have one ICS with many and separated impact sites). In diffused type of disasters, interorganizational coordination is all but impossible.

4. The <u>recurrence</u> of involvement.

For some communities, involvement in disaster occasions is a recurrent happening, not a new experience. In fact, there may be even subneighborhood differences; in a number of communities around the world particular groups living in flood plains can almost anticipate some flooding every year just as residents around major chemical complexes can expect emergencies. However, the fact of prior experience, of even many experiences, appears to be far less important than whether the prior experiences have been incorporated into ongoing attitudes and behaviors. There are cases, for example, where the development of a disaster <u>subculture</u> are unrelated to frequency of event occurrence. In terms of mental health problems, disaster subcultures essentially quasi-routinize disaster occasions and makes them much less disruptive and disturbing. However, if recurrent experiences are not so quasi-routinized, they can become a source of psychological stress and strain. Depending on the prior development of a disaster subculture, recurrence as a disaster characteristic may influence mental health either positively or negatively.

There are also pluses and minuses for organizational involvement in recurrent disasters. Everything else being equal, most organizations generally plan and respond better the more they have recurrences of similar disaster experiences. However, it should

not be automatically assumed that experience of disasters per se is good; some groups learn little and worst, occasionally a few learn the "wrong" lessons. Apart from that, there is a strong tendency to take the last disaster and whatever needs and problems it creates as the prototype of future disasters. This can be very important. The next disaster may be a drastically different occasion and create very different demands for the involved organizations (see, Forrest, 1979 for a study of a community which usually expected a hurricane but instead got a flood).

The affected population.

1. The length of involvement of the affected population.

Length of involvement refers to the crisis response of the population in the disaster occasion; it should not be confused with duration of the threat which is more meaningfully considered a dimension of the physical agent. Thinking of length in the sense indicated permits us to take into account occasions where the duration of the primary disaster agent is short but the length of crisis involvement is longer because of perceived secondary threats (e.g. an accident involving a train carrying chemicals may be over in a few minutes, but the threat or actual slow release of toxic chemicals from the wrecked train may generate a crisis that lasts days as was the case at Mississauga, Canada.Or, as a number of disaster researchers have noted, there could be an occasion like the 1979 nuclear hazard accident at Three Mile Island where the duration of the accident was relatively short but psychologically the length of the crisis for certain population segments continues to this day (the volcanic eruption at Mt. St. Helens had this same characteristic for some of the nearby residents).

Also, because the issue here is primarily a matter of perception by involved parties there can be rather sharp differences between the risks as perceived by so-called experts and as seen by the populace at large. Thus, in developed societies some potential threats in the nuclear and chemical spheres are often differently viewed by interested parties with citizens in general using different criteria for risk assessment than do workers or specialists from these areas. The differences result less because a technology is involved but more because of the bases of the perceptions involved: those most intimately involved with a threat downplaying it in a fashion similar to the so-called "fatalism" exhibited to some natural threats (e.g. a volcanic eruption or flood) by native populations in developing countries. Such major perceptual differences can pose major planning difficulties for disaster planners on obtaining organizational definitions of what is or is not safe and getting population to evacuate, etc. More generally, from a planning perspective, the greater the length of the perceived involvement, the more responding organizations should anticipate criticism.

2. The unfamiliarity of the crisis.

Along with low predictability, high unfamiliarity with a disaster occasion appears to be both psychologically and organizationally disturbing. This issue has several different aspects. For example, people have different images of different kinds of threats. They are clearly most concerned with and afraid of those that are most unfamiliar, such as in developed societies of some of the threats associated with nuclear power plants and chemicals. The knowledge that populations in these societies have of many natural disaster threats may be little better than their knowledge of other threats, but there is little doubt some threats are perceived as more unfamiliar and therefore more worrisome to most people. Actually of course, perception and knowledge of hazards and risk will vary considerably from community to community as their residents bring different backgrounds to the matter.

Also, as noted in studies on handling of the dead the great majority of people--at least in American society--are unfamiliar with dead bodies, especially in large numbers. They become very psychologically disturbed if they have to deal directly with the dead, a reaction not as strong in some developing societies. Also few people are accustomed to seeing very badly injured or disfigured live or dead bodies; such an unfamiliar sight in a disaster occasion is usually very psychologically upsetting. Many transportation disasters, as well as flash floods, tend to generate such sights (for plane crashes, see Quarantelli, 1980); in addition to being psychologically disturbing, they are often disruptive of search and rescue efforts.

Unfamiliarity can be associated with the very "statistically unusual." For example, very few people have had experience in search and rescue activities. Too, in many disasters there is a need to undertake many varied tasks in very short periods of time; what during normal times is familiar and spread out over time often occurs almost simultaneously in disasters. Although not always present, a strong element in most such situations is a perception of being unable to control what one is subject to. These situations are seen as simply impinging upon disaster victims.

3. The predictability of involvement.

As just indicated, there are times when populations can predict their possible involvement in disasters; in other cases, the crises are unexpected. Such evidence as exists indicates the unexpected is much more psychologically disturbing than the expected. If one can predict involvement in a dangerous situation, culpability for the involvement is more likely to be attributed to self. If predictability is low--as seemed to be the case in the Mt. St. Helens volcanic eruption and the Three Mile Island nuclear accident--others are more likely to be held culpable; there is more likely to be blame assessment. Also if predictability is high--as

in the instances of populations living near chemical complexes or on flood plains--there is greater sensitivity to danger cues, willingness to act upon them, and less trauma in evacuations. Finally, if predictability is low, we speculate there would be a tendency for a greater affective reaction.

The common thread in all of this is the element of the unexpected; as a consequence, persons often can not bring their normal routines and coping mechanisms to deal with the crisis. The result is considerable stress and strain. There are also organizational problems in predicting the unexpected; by definition it is very difficult. Furthermore, the less a situation is expected, the less likely officials in relevant organizations will have prepared and trained for such occasions. This has been part of the problem many local emergency management agencies in the United States have had in coping with hazardous chemical disasters, which have only come to the fore in the last decade or two in most societies.

4. The depth of involvement of the population.

It is possible to take certain kinds of losses (e g. deaths of family members, loss of homes, forced moves) as an indication of disaster impact. However, as noted earlier, the relative nature of what is involved may be more important than absolute features. It is not so much what one has lost in absolute terms, but what one has lost relative to others. In one of the first disaster studies, Prince (1920) noted that victims of the Halifax ship harbor explosion felt less personal loss because their own losses were in the context of around 2,000 dead and enormous property damage. The perception of relative deprivation, of course, can be in relation to other people as well as one's own standard of living. In absolute terms, some poor populations may lose more than some wealthier ones; yet the psychological stress may be higher for the more affluent. The general point is that seemingly same kinds of disasters may be rather different because of the differential depth of involvement of victims.

This is a particularly problematical problem for organizational disaster planning. It generally is not a matter for which too many realistic prior scenarios can be projected. However, sensitivity at least to the possibility that the issue could arise, can somewhat lessen its impact when it occurs.

Does this discussion of these eight dimensions exhaust those which should be considered in any meaningful disaster typology? This is almost certainly not the case. For example, two other possible dimensions might be mentioned.

One would be resource availability, that is what would be useable for disaster planning. Some societies and communities simply are more resource rich than others. While this is not a usual distinction between industrial/urbanized societies and

agricultural/rural ones, it is one roughly between developed and developing countries (although those labels and the distinctions implied, as we have discussed elsewhere, leave much to be desired). Everything else being equal, organizations, communities and societies which have more resources can better prepare for and respond to disasters.

Likewise, there are differences in both degree and kinds of disaster preparedness around the world. While there is some correlation between preparedness and development it is far from being a high one, and thus should be treated separately. Using resource availability and degree of preparedness as additional dimensions for the creation of disaster typologies would seem both logically and empirically justified (and these have been used in an attempt to develop a societal typology for the disaster emergency medical service area, see Quarantelli, 1989). But for the moment, until typologies based on a generic approach to disasters are systematically generated, used, and evaluated as to their usefulness, this can be but a suggestion and not a recommendation.

Different Phases of Disaster Planning

The examples given in the prior discussion are almost exclusively with respect to preparing for and responding in the two middle phases or stages of the disaster planning cycle, namely emergency preparedness and emergency response. There is little doubt a generic or all hazard approach is most useful for those two parts of the planning cycle. The eight different dimensions discussed which cut across agents is equally applicable to the two middle phases of the disaster planning cycle.

A partial case can be made that a generic approach is also valid for approaching certain disaster related mitigation and disaster recovery issues. Thus, such phenomena as preimpact individual disaster insurance coverage or the longer run demographic consequences of disasters seem relatively independent of the specific disaster agent involved. Research has shown there is widespread reluctance to purchase disaster insurance; there are relatively few long run important consequences on the demographic structures of disaster stricken localities. Further studies may find significant cross societal differences in these matters but that still would be a social situational rather than agent specific differentiating factor.

Nevertheless, a qualification on the agent specific independence of disaster mitigation behavior might be added especially for mitigation planning activities. There are two reasons for this. Some particular measures which might be taken to prevent or at least weaken disaster impact are somewhat agent or agent class specific. For instance, cloud seeding to prevent the formation of hurricanes or encasement of nuclear plants in building structures that would mitigate nuclear radiation leaks are measures that would

have little inherent applicability to other kinds of disaster agents. In addition, the knowledge bases and specialists that would be needed for such planning are rather different than those received for other kinds of preventive or mitigation planning.

This is not to say that in all respects the planning process involved in disaster mitigation would be totally agent specific. For example, the general kinds of bureaucratic arguments advanced for a physical solution to potential disaster problems, the social sources of support and resistances in the governmental and private sector to such measures, population views of the legitimacy and acceptability of the planning suggested, and willingness to put preventive measures on a political agenda, do seem to show considerable similarities irrespective of the particular disaster agent involved. Thus, what researchers have found about the non-technical difficulties in implementing earthquake mitigation measures do not seem to be that different from the problems involved in instituting hazardous chemical disaster preventive measures. Put another way, many of the human, group, organizational, community and societal aspects of disaster mitigation planning, tend to be generic rather than agent specific.

This is even truer of disaster recovery planning. To be sure, a few technical aspects will be agent specific. How to clean up pollution of agricultural land from salt water flooding and from nuclear radiation are rather different technical recovery activities. But the more social aspects of the recovery phase of disaster planning are more generic than they are agent specific.

The implications of this for the planning process seems fairly clear. Priority should be given by any organization involved with any aspects of the process to taking a generic approach to disasters. This would be especially true for institutional planning for emergency and emergency response. For more technical aspects, especially for mitigation and to a lesser extent for recovery activities, some attention needs to be paid to more agent specific aspects of the problem. Of course, in some ways, this is no different from the argument that while planning for emergency preparedness and emergency response should be generic, certain agent specific aspects need to be kept in mind (e.g., the emergency time handling of burn or radiation cases is somewhat different from that of handling fractures and broken bones).

In conclusion, apart from theoretical, logical or empirical research reasons for taking a generic or all hazard approach to disaster planning, there ar also some practical ones. They are: (a) cost-efficient in terms of expenditure of time, effort, money and resources; (b) a politically better strategy because it mobilizes a wider range of groups interested in disaster planning thus creating a more powerful constituency for the process; (c) a major way of avoiding duplication, conflict, overlaps, and gaps in preparedness activities and actual responses to disasters; and (d)

a way of increasing efficiency as well as effectiveness in any organized effort to cope with disaster occasions.

Ecological Problems

We want to finish up with a few remarks about ecological problems. In no way can we do justice with the important issues that are involved here, but let us mention a few important things.

Actually there is considerable variation in what tends to be classified as ecological or environmental problems. In the most general terms the reference is often to macrolevel or global processes such as atmospheric warming with attendant ozone depletion and sea level rises, desertification and drought along with deforestation, acid depositions into the biosphere and soil degradation, and the decrease in biodiversity (Shrivastava, 1993). Without doubt these are major problems faced by the world and human society. However, for our purposes, we prefer to discuss problems that can at least partly be dealt with at the local community level. Thus, we will be primarily talking about under ecological problems such matters as episodes of air pollution, specific instances of water contamination, and the effects of toxic waste sites on nearby neighborhoods and their residents.

Therefore, in this section of the paper we will briefly note, as said earlier, that ecological problems differ substantially from disasters in their origins, careers and effects.

The issue, is not whether there are personally and socially bad effects or even their magnitudes. Obviously ecological or environmental problems can have drastic negative outcomes. In fact, it is very possible that more people are killed and made sick through pollution and contamination of different kinds than are so affected by all sudden natural and technological disasters over given periods of time. For instance, the economic costs alone, resulting from chronic exposure to hazardous fumes from chemical plants, would probably dwarf through the years by far what a typical sudden chemical disaster could bring about of an economically negative nature in the same population.

But while the end results may be and probably are worst than from sudden natural and technological disasters, chronic ecological problems very seldom create an immediate emergency or crisis. As said earlier, they are slower in on-set, not dramatically occurring in a very short time period of moments, minutes or hours at most as in the case in the instance of disasters. In that sense, ecological problems and disasters have different evolutionary patterns or careers, especially in terms of the time in which they will have an overt unfavorable effect. In an earthquake, most of the negative effects will be relatively immediate, the damage is done in a relatively short time period. (Even in disasters where the impact does not become immediately overt as in cancer cases

produced by a radiation fallout from a nuclear plant accident such as Chernobyl, the actual damage is done in a very brief time period). Whereas in ecological problems, the negative effects tend to be cumulative, accumulating over time with often no clear cut tip point into bad consequences (note how the greenhouse effect and its presumed effect on the ozone layer is talked about).

Also, the origins of ecological problems are generally somewhat different than those of disasters, both in terms of a single physical agent and its visibility. Most, although not all disasters, involve identifiable physical factors usually of a precipitating nature (e.g., the slippage of plates creating an earthquake, a chemical reaction resulting in an explosion). In disasters too the endangering risks are usually fairly visible. Thus, there are falling ashes and lava in a volcanic eruption or fires and explosive forces in a chemical disaster. To be sure some although not all nuclear or biotechnological disasters can be occasioned by unseen factors or forces. But ecological problems as a whole are far less visible, especially in terms of an originating source. For example, while air pollution by way of smog can sometime be literally seen, it is difficult to see the motor fumes from multitude of scattered vehicles and plants all contributing to the end product over long periods of time.

One major consequence of all this is that somewhat different planning strategies and managing tactics have to be used for ecological problems compared to disasters. When the sources of the risk are different, when the threat evolves in different ways, when the effects are different, the approach for planning and managing them has to be different. In the most general terms, the matter has to be approached as a social problem rather than as an unexpected crisis. In this respect, ecological problems require the same kind of structural changes that have to be used for trying to address poverty, homelessness, crime, malnutrition, etc. In this, more fundamental and difficult social changes are required than is typically required in preparing for and managing sudden disasters. On the other hand, people and their communities are more accustomed to trying to cope with persistent community problems than they are trying to adjust to possible low frequency but high impact sudden disasters. The problems may be more difficult to solve, but in one sense they are more familiar to the affected parties because they can be seen as having some things in common with other community social problems.

In conclusion, if I have been able to make you think about the similarities and differences between technological and natural disasters, and between them and ecological problems, one of the underlying purposes of my talk has been achieved. If, in addition, irrespective of whatever position you take on these matters, you see better the consequences for planning and managing such occasions, I have also attained one of my other objectives.

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