

CHAPTER 2

A Heuristic Approach to Future Disasters and Crises: New, Old, and In-Between Types

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Disasters and crises have been part of the human experience since people started living in groups. Through the centuries, however, new hazards and risks have emerged that have added to the possibilities of new disasters and crises arising from them. Only a very small fraction of risks and hazards actually lead to a disaster or crisis, but they are usually a necessary condition for such surfacing. New types have emerged while older ones have not disappeared. The development of synthetic chemicals in the 19th century and nuclear power in the 20th century created the risk of toxic chemical disasters and crises from radioactive fallouts. Ancient disasters such as floods and earthquakes remain with us today. This chapter raises the question of whether we are at another important historical juncture with the emergence of a new distinctive class of disasters and crises not seen before.

Our goal is twofold. First, we seek to describe and analyze these possibly new phenomena. Our second aim is to categorize all disasters and crises into a systematic conceptual framework. The newer disasters and crises are additions to older forms; they recombine elements of old threats with new vulnerabilities. In the future, we will concurrently see new types of disasters and crises, along with continuing manifestations of old ones, as well as mixed forms that in some respects have characteristics of older types mixed in with newer elements. In short, as we move further into the 21st century, risks and hazards will have more heterogeneity than ever before with their occasional manifestations in disasters and crises. This differentiation will present very complicated and challenging problems in planning for and managing such negative occurrences.

We offer here a heuristic approach to understanding the disasters and crises of the future. The chapter is presented primarily as a guide to further inquiry, hopefully stimulating more investigation on conceptions of disasters and crises in the past, present, and future. Unlike concepts in some areas of scientific inquiry, in which definitive conclusions can be reached (e.g., about the speed of light), the phenomenon we are discussing is of a dynamic nature

and subject to change over time. The answer to the question of what constitutes a disaster or crisis has evolved and will continue to do so. Perry, in his chapter in this handbook, provides an impressive analysis of how scholarly discussion has been trending toward a more generic viewpoint, while also showing that most formulations can be categorized as one of three kinds.

NOT NEW SOCIAL PHENOMENA

Human societies have always been faced with risks and hazards. Earthquakes, very hostile inter-and intragroup relationships, floods, sudden epidemics, threats to take multiple hostages or massacre large numbers of persons, avalanches, fires, tsunamis, and similar relatively quickly appearing phenomena have marked human history for centuries if not eons. Some of these have been the source of disasters and crises.

These explicitly recognized negative social phenomena requiring a group reaction go back to the times when human beings started to live in stable communities, approximately 5,000 to 6,000 years ago (see Lenski, Lenski, & Nolan, 1991). However, recent archeological studies suggest that humans started to abandon nomadic wanderings and settled into permanent sites around 9,500 years ago (Balter, 2005), so community-recognized disasters and crises might have an even longer history.

The earliest occurrences are described in legends and myths, oral traditions and folk songs, religious accounts, and archeological evidence from many different cultures and sub-cultures around the world. For example, a “great flood” story has long existed in many places (Lang, 1985). These prehistorical indications of disasters and crises have of course been added to considerably by the development of history with descriptive accounts of contemporary occurrences, as well as examinations of past ones.

As human societies have evolved, new threats and hazards have emerged as well. New dangers have been added to existing ones; for example, risks from chemical, nuclear, and biological agents have been added to natural hazards.

Intentional conflict situations have become more damaging, at least in the sense of involving more and more victims. The last 90 years have seen two world wars, massive air and missile attacks by the military on civilians distant from battle areas, many terrorist attacks, widespread ethnic strife, and so forth. Just in the last decade, genocide may have killed one million persons in Rwanda, and millions have become refugees and tens of thousands have died in Dafur in the Sudan in Africa; similar attacks have occurred in Indonesia. Also, although terrorism is not a new phenomenon, its targets have expanded considerably.

Also, although we will discuss it only in passing here, a case can be made that there has been a progressive quantitative increase, especially in the last two centuries, of new risks and hazards (e.g., chemical and nuclear). In fact, some scholars and academics have argued that the very attempt to cope with increasing risks, especially of a technological nature, is indirectly generating new hazards. As the human race has increasingly been able to cope with securing such basic needs as food and shelter, some of the very coping mechanisms involved (such as the double-edged consequences of agricultural pesticides) have generated new risks for human societies (Beck, 1999; Perrow, 1999;). For example, in 2004 toxic chemicals were successfully used to eradicate massive locust infestations affecting 10 Western and Northern African countries. But at the same time, those very chemicals had other widespread detrimental effects on humans, animals, and crops (IRIN, 2004). Implicit in this line of thinking is the argument that double-edged consequences from new innovations (such as the use of chemicals, nuclear power, and genetic engineering) will continue to appear (Tenner, 1996).

Given all of this, is it possible to say how many disasters and crises have occurred? For a variety of theoretical and practical reasons discussed elsewhere (see Quarantelli, 2001b) any attempt to obtain exact quantification is fraught with major difficulties. Nevertheless, the Centre for Research on the Epidemiology of Disasters (CRED) has reported that from 1900 to 2004 there have been slightly more than 14,000 disasters (but all crises involving conflict as well as famines were not included in this statistical compilation, although droughts and very extreme temperature variations were counted). In addition, the CRED figures indicate an upward trend in occurrences of this nature. (For more on CRED and its statistics, visit its Web site, <http://www.unisdr.org>).

On the other hand, Alexander (2005, p. 25), citing some of the same data sources used by CRED, has written that there are about 220 natural catastrophes, 70 technological disasters, and 3 new armed conflicts each year. He also states that disasters are increasing. The cited numbers are not consistent with the CRED statistics and the figures he reports for technological disasters are far higher than Cutter (1991) found in her international survey of evacuations in chemical disasters. Still other numbers advanced by other sources vary even more (e.g., Glickman, Golding, & Silverman, 1992; the many chapters in Ingleton, 1999; the annual World Disasters Reports issued by the Red Cross and Red Crescent Societies, and the listing of current disasters in every issue of *The Disaster Prevention and Management Journal*).

What can we make of these inconsistent observations? We can probably accept without too much difficulty that “disasters” from a purely numerical viewpoint are not rare, isolated events. We might also tentatively assume that disasters and other crises are increasing, given that it can be shown that hazards and risks have increased. But we should also note two other things. Clearly, any statistics about numbers rest heavily on the definitions used. For example, just including or excluding “famines” can massively skew any statistical count because we would be speaking of hundreds of occurrences and millions of people (Quarantelli, 2001b). These different figures also raise questions about future occurrences. Can we really say, as some of us have (e.g., Quarantelli, 1991b), that the future will bring more disasters, if we have no reliable statistics on prior happenings as a baseline to use in counting? At present, it would seem safer to argue that some future events are qualitatively different, and not necessarily that there will be more of them in total (although we would argue the last is a viable hypothesis that requires a good statistical analysis).

SOCIETAL INTERPRETATIONS AND RESPONSES

Societies for the most part have not been passive in the face of these increasing dangers to human life and well-being. This is somewhat contrary to what is implicit in much of the social science literature, especially that concerned with disasters. In fact, some of these writings directly or indirectly state that a fatalistic attitude prevailed in the early stages of societal development (e.g., Quarantelli, 2000) as a result of religious beliefs that attributed negative societal happenings to punishments or tests by supernatural entities (the “Acts of God” notion, although this particular phrase became a common use mostly because it served the interests of insurance companies). But prayers, offerings, and rituals are widely seen as means to influence the supernatural. So passivity is not an automatic response to disasters and crises even by religious believers, an observation sometimes unnoticed by secular researchers.

Historical studies strongly indicate that societal interpretations have been more differentiated than once believed and have shifted through the centuries, at least in the Western

world. In ancient Greece, Aristotle categorized disasters as the result of natural phenomena and not manifestations of supernatural interventions (Aristotle, 1952). However, with the spread of Christianity about 2,000 years ago came the belief that disasters were “special providences sent directly” from “God to punish sinners” (Mulcahy, 2002, p. 110). Thus, in the Middle Ages, even scholars and educated elitists “no longer questioned the holy origins of natural disasters” (Massard-Guilbaud, Platt, & Schott, 2002, p. 19). Starting in the 17th century, however, such explanations started to be replaced by “ones that viewed disasters as accidental or natural events” (Mulcahy, 2002, p. 110). This, of course, also reflected a strong trend toward secularization in Western societies. Perhaps this reached a climax with the 1755 Lisbon earthquake, which Dynes notes can be seen as the “first modern disaster” (2000b, p. 10).

So far our discussion has been mostly from the perspective of the educated elitists in Western societies. Little scholarly attention seems to have been given to what developed in non-Western social systems. One passing observation about the Ottoman Empire and fire disasters hints that the pattern just discussed might not be universal. Thus while fire prevention measures were encouraged in cities, they were not mandated “since calamities were considered” as expressions of the will of God (Yerolympos, 2002, p. 224). Even as late as 1826, an Ottoman urban building code stated that according to religious writing “the will of the Almighty will be done” and nothing can and should be done about that. At the same time, this code advances the idea that nevertheless there were protective measures that could be taken against fires that are “the will of Allah” (quoted in Yerolympos, 2002, p. 226). Of course incompatibilities between natural and supernatural views about the world are not unique to disaster and crisis phenomena, but that still leaves the distinction important. For an interesting attempt to deal with these two perspectives see the paper entitled “Disaster: a reality or a construct? Perspective from the East,” written by Jigyasu (2005), an Indian scholar.

Historians have also noted that the beliefs of educated and professional elitists and citizens in general in almost all societies may be only partly correlated. Certainly this was true in the past. But even recently, an Australian disaster researcher asserted that after the 2004 Southwestern Asian tsunami most of the population seemed to believe that the disaster was “sent either as a test of faith or punishment” (McAneney, 2005, p. 3). As another writer noted, following the tsunami, religiously oriented views surfaced. Some were by “fundamentalist Christians” who tend to view all disasters “as a harbinger of the apocalypse.” Others were by “radical Islamists” who are inclined to see any disaster that “washes the beaches clear of half-nude tourists to be divine” (Neiman, 2005, p. 16). After Hurricane Katrina, some leaders of evangelical groups spoke of the disaster as punishment imposed by God for “national sins” (Cooperman, 2005).

However, in the absence of systematic studies, probably the best hypothesis to be researched is that at present religious interpretations about disasters and crisis still appear to be widely held, but relative to the past probably have eroded among people in general. The orientation is almost certainly affected by sharp cross-societal differences in the importance attributed to religion, as can be noted in the religious belief systems and practices currently existing in the United States and many Islamic countries, compared to Japan or a highly secular Western Europe.

Apart from the varying interpretations of the phenomena, how have societies behaviorally reacted to the existing and ever increasing threats and risks? As a whole, human groups have evolved a variety of formal and informal mechanisms to prevent and to deal with crises and disasters. But societies have followed different directions depending on the perceived sources of disasters and crises. Responses tend to differ with the perception of the primary origin (the supernatural, the natural, or the human sphere).

For example, floods were seen long ago as a continuing problem that required a collective response involving engineering measures. Stories that a Chinese Emperor, 23 centuries before Christ, deepened the ever flooding Yellow River by massive dredging and the building of diversion canals may be more legend than fact (Waterbury, 1979, p. 35). However, there is clear evidence that in Egypt in the 20th century B.C., the 12th Dynasty Pharaoh, Amenemher II, completed southwest of Cairo what was probably history's first substantial river control project (an irrigation canal and dam with sluice gates). Other documentary evidence indicates that dams for flood control purposes were built as far back as 1260 B.C. in Greece (Schnitter, 1994, p. 1, 8–9). Such mitigatory efforts indicate both the belief that there was a long-term natural risk as well as one that could be coped with by physically altering structural dimensions.

Later, particularly in Europe, there were many recurrent efforts to institute mitigation measures. For example, earthquake-resistant building techniques were developed in ancient Rome, although "they had been forgotten by the middle ages" (Massard-Guilbaud, Platt, & Schott, 2002, p. 31). The threats from floods and fires spurred mitigation efforts in Greece. Starting in the 15th century, developing urban areas devised many safeguards against fires, varying from regulations regarding inflammable items to storage of water for fire-fighting purposes. Dams, dikes, and piles along riverbanks were built in many towns in medieval Poland (Sowina, 2002). Of course actions taken were not always successful, but the efforts showed that in the face of everyday dangers, citizens and officials were often not passive but proactive as well as reactive. If nothing else, these examples show that organized mitigation efforts have been undertaken for a long time in human history. Trying to prevent or reduce the impact of possible disasters is not an idea, as some seem to think, that was invented by the US Federal Emergency Management Agency (FEMA), which laudably did move in that direction at the end of the last century.

Two other major behavioral trends have persisted that are really preventive in intent if not always in reality. One has been the routinization of responses by emergency-oriented groups so as to prevent emergencies from escalating into disasters or crises. For example, in ancient Rome, the first groups informally set up to fight fires were composed of untrained slaves. But when a fire in 6 A.D. burned almost a quarter of Rome, a Corps of Vigiles was created that had full-time personnel and specialized equipment. In more recent times, there are good examples of this routinization in the planning of public utilities that have standardized operating procedures to deal with everyday emergencies so as to prevent them from becoming disasters. Various UN and other international organizations such as the International Atomic Energy Agency try to head off the development of crises in situations of conflict. In short, societies have continually evolved groups and procedures to try to prevent old and new risks and threats from escalating into disasters and crises.

A second more recent major trend has been the development of specific organizations to deal first with wartime crises and then with peacetime disasters. Civilian emergency management agencies have evolved from roots in civil defense groups created for air raid situations (Blanchard, 2004). Accompanying this has been the professionalization of disaster planners and crisis managers. There has been a notable shift from the involvement of amateurs to educated professionals in societies such as Canada, the United States, Australia, and some Western European countries. Thus, for about a century societies have been creating specific organizations to deal first with new risks for civilians created by changes in warfare, and then improving on these new groups as they have been extended to peacetime situations.

Human societies adjusted not only to early risks and hazards, but also to the newer ones that appeared up to the last century. The very survival of the human race is testimony to the coping and adjustive social mechanisms of humans as they face such threats. Occasionally a few

communities and groups have not been able to cope with the manifestations of contemporary risks and hazards, but these have been very rare.

Neither disasters nor crises involving conflict have had much effect on the continuing existence of cities anywhere in the world. Throughout history, many cities have been destroyed. They have been “sacked, shaken, burned, bombed, flooded, starved, irradiated and poisoned” but in almost every case, phoenix-like, they have been reestablished (Vale & Campanella, 2004, p. 1). Around the world from the 12th to the 19th centuries, only 42 cities throughout the world were “permanently abandoned following destruction” (Vale & Campanella, 2004, p. 1). The same analysis notes that large cities such as Baghdad, Moscow, Aleppo, Mexico City, and Budapest and we may add more recently Dresden, Tokyo, Hiroshima, and Nagasaki, all suffered massive physical destruction and lost huge numbers of their populations as a result of disasters and wartime attacks. But all were rebuilt and rebounded; in fact, at the start of the 19th century, “such resilience became a nearly universal fact” about urban settlements around the world (Vale & Campanella, 2004, p. 1). Looking at the earlier mentioned Japanese cities today as well as Warsaw, Berlin, and Hamburg, it seems this recuperative tendency was still very strong at the middle of the last century (see also Schneider & Susser, 2003). Given that, the widespread predictions in 2005 that New Orleans will not recover from the catastrophic impact of Hurricane Katrina are very unlikely to be correct.

SYSTEMATIC STUDIES ARE NEW

Early efforts to understand and to cope with disasters and crises were generally of an ad hoc nature. With the strong development of science in the 19th century, there was the start of some understanding of the physical aspects of natural disasters, and these had some influence on structural mitigation measures. However, the systematic social science study of such negatively viewed occurrences is only about a half-century old. This is not surprising given that the social sciences as a whole are about 100 years old. Thus, social science knowledge for coping with disasters has only recently become available.

Disaster and crisis research of a social nature is a post-World War II phenomenon. That some of the earliest pioneer researchers are still around as of the writing of this chapter is a good indication of the recent origin of this field of study. This history is spelled out in detail, although selectively, elsewhere (see e.g., Fritz, 1961; Kreps, 1984; Quarantelli, 1988a, 2000; Schorr, 1987; Wright & Rossi, 1981).

But if a case is to be made that there are identifiable but new aspects of this in nontraditional disasters and crises, some kind of comparison has to be made. What are the distinctive aspects of the newer disasters and crises that are not seen in traditional ones? To deal with this and to go beyond journalistic sources, we considered what social science studies and reports had found about behavior in disasters and crises up to the present time. We then implicitly compared those observations and findings with the distinctive behavioral aspects of the newer disasters and crises.

To be sure, such accounts and reports as do exist are somewhat selective and not complete. Nevertheless, at the present time, case studies and analytical reports on natural and technological disasters (and to some extent on other crises) number in the four figures. In addition, numerous impressions of specific behavioral dimensions have been derived from field research (for summaries and inventories see Alexander, 2000; Cutter, 1994; Dynes & Tierney, 1994; Dynes, DeMarchi, & Pelanda, 1987; Farazmand, 2001; Mileti, 1999; Oliver-Smith, 1999a; Perry, Lindell, & Prater, 2005; Rosenthal, Boin, & Comfort, 2001; Rosenthal, Charles, & ‘t Hart,

1989; Tierney, Lindell, & Perry, 2001; Turner & Pidgeon, 1978; Waugh & Hy, 1990). In short, there is currently a solid body of research-generated knowledge developed over the last half century of continuing and ever-increasing studies around the world in different social science disciplines.

DIFFERENT CONCEPTIONS OF DISASTERS AND CRISES

One issue that has interested researchers and scholars has been on how to conceptualize disasters and related collective crises. Unfortunately, there has been only partial consensus on how to approach the problem. It is not that there have not been major efforts to clarify the important question of what is a disaster or a crisis. What is X? If one wants to plan for X or point out the consequences of X, there has to be at least some minimum consensus about what X is. Otherwise, people will often talk past one another and about different things. As evident in two recently edited volumes on what is a disaster (Quarantelli, 1998; Perry & Quarantelli, 2005). At the practical or operational level the situation is even worse. Methods or procedures that might be advocated will simply make no sense given the different conceptions of disaster or crisis that might be involved (e.g., effective police actions for riot occasions need to be rather different than for consensus situations, as discussed later).

It is true that it is more important to look into what creates or generates something than it is to identify something. But it is very difficult to discuss what generating conditions are, unless one can specify what one is talking about in the first place. In other words, characteristics have to be roughly identified before one can examine the conditions and the consequences. That is our rationale behind specifying characteristics first.

However, there is far from full agreement that all disasters and crises can be categorized together as relatively homogeneous phenomena, despite the fact that there have been a number of attempts to distinguish between, among, and within different kinds of disasters and crises. However, no one overall view has won anywhere near general acceptance among self-designated disaster and crisis researchers. To illustrate we will briefly note some of the major formulations advanced.

For example, one of the very earliest attempts distinguished between natural and technological disasters, although some pioneer efforts such as at the Disaster Research Center (DRC) never accepted that as a meaningful distinction. The basic assumption was that the inherent nature of the agent involved made a difference. Implicit was the idea that technological dangers or threats present a different and more varying kind of challenge to human societies than do natural hazards or risks. But most researchers have since dropped the distinction as hazards have come to be seen as less important than the social setting in which they appear. Thus, in recent major volumes on what is a disaster (Perry & Quarantelli, 2005; Quarantelli, 1998), the distinction was not even mentioned by most of the two dozen scholars who addressed the basic question. But there are still some who say that separating out disasters with a technological base is a worthwhile endeavor (e.g., Picou & Gill, 1996; see also Erikson, 1994).

Other scholars have struggled with the notion that there may be some important differences between what can be called "disasters" and "crises." The assumption here is that different community-level social phenomena are involved, depending on the referent. Thus, some scholars distinguish between consensus and conflict types of crises (Stallings, 1988, tries to reconcile the two perspectives). In some research circles, almost all natural and most technological disasters are viewed as consensus types of crises (Quarantelli, 1998). These are

contrasted with crises involving conflict such as riots, terrorist attacks, and ethnic cleansings and intergroup clashes.

In the latter type, at least one major party is either trying to make it worse or to extend the duration of the crisis. In natural and technological disasters, no one deliberately wants to make the situation worse or to create more damage or fatalities. Disputes or serious disagreements regarding natural or technological disasters are inevitable, and personal, organizational, and community conflicts will exist, for example in the recovery phase of disasters, where scapegoating is common (Bucher, 1957; Drabek & Quarantelli, 1967, 1969). In some crises the overall intent of major social actors is to deliberately attempt to generate conflict. In contrast to the unfolding sequential process of natural disasters, terrorist groups or protesting rioters not only intentionally seek to disrupt social life but they also modify or delay their attacks depending on perceived countermeasures.

Apart from a simple observable logical distinction between consensus and conflict types of crises, empirical studies have also established behavioral differences. For example, looting behavior is distinctively different in the two types. In the typical disaster in Western societies, almost always looting is very rare, covert and socially condemned, done by individuals, and involves targets of opportunity. In contrast, in many conflict crises looting is very common, overt and socially supported, undertaken by established groups of relatives or friends, and involves deliberately targeted locations (Quarantelli & Dynes, 1969). Likewise, there are major differences in hospital activities in the two kinds of crises, with more variation in conflict situations. There are differences also in the extent to which both organizational and community level changes occur as a result of consensus and conflict crises, with more changes resulting from conflict occasions (Quarantelli, 1993b). Finally, it has been suggested that the mass media operates differently in terrorism situations and in natural and technological disasters (Committee of Concerned Journalists, 1999, 2001). However, see Fischer (2003) for a contrary view that sees terrorist occasions as more or less being the same as what behaviorally appears in natural and technological disasters).

It is not unimportant to note that both the Oklahoma City bombing and the 9/11 World Trade Center attack led to sharp clashes between different groups of initial organizational responders. There were those who saw these occurrences primarily as criminal attacks necessitating closure of the location as a crime scene, and those who saw them primarily as situations where the priority ought to be on rescuing survivors, a universal disaster response. In the 9/11 situation, the clash continued later into the issues of the handling of dead bodies and debris clearance. At the operational level, although it was not verbalized in those terms, the responders split along the consensus/conflict line. All this goes to show that crises and disasters are always socially constructed, and whether it is by theorists, researchers, operational personnel, or citizens, any designation comes from the construction process and is not inherent in the phenomena itself. This is well illustrated in an article by Cunningham (2005), who shows that a major cyanide spill into the Danube River was differently defined as an incident, an accident, or a catastrophe, depending on how culpability was perceived and who was providing the definition.

Still other distinctions have been made. Some advocate "crisis" as the central concept in description and analysis (see the chapter by Boin in this handbook). In this line of thinking, a crisis involves an urgent threat to the core functions of a social system. A disaster instead is seen as "a crisis with a bad ending." To an extent this is consistent with the earlier expressed idea that although there are many hazards and risks, only a few actually manifest themselves. But the crisis idea does not differentiate among the manifestations themselves as the consensus and conflict distinction does. Also, to some a "crisis" implies immediacy and need for very quick

action, but existing hazards and risks infrequently require this. (On the differences between the two ideas, see Boin, 2005.)

Finally, there also have been recent attempts to categorize conflict situations as one type of disaster. Thus, some talk of natural disasters, accidental disasters (mostly with reference to technological disasters), and deliberate disasters. Of course one of the crises we discuss later, computer system failures, can be the result of either mechanical accidents or deliberate insertions of viruses. Many transportation accidents, such as plane crashes or train wrecks, can also be both. The same can be said for forest fires; some result from arson, some from lightning. As a reviewer of an initial draft of this chapter noted, however, "it is difficult to ignore that some of the phenomena that disaster and crisis researchers are interested in, involve intentionality on the part of the social actors involved (e.g., terrorism) and some simply do not have that characteristic (e.g., natural disasters)." Thus "that distinction would seem important to include in any attempt to characterize disasters and/or crises." This reviewer also noted that some crises such as computer system failures do not necessarily involve conflict. Still others have argued that disasters, riots, and terrorist acts should be seen as three different kinds of crises (Peek & Sutton, 2003). More recently there have been attempts to differentiate, in a qualitative sense, disasters from catastrophes (Quarantelli, 2005b).

The preceding observations suggest that it would be far better for researchers to avoid focusing on a possible agent that might be involved and instead to examine the social behavior that appears and is the essence of a disaster or crisis. It would also seem that the intentions of participants in the setting cannot be ignored.

This is not the place to try and settle conceptual disagreements and we will not attempt to do so. Anyone in these areas of study should acknowledge that there are different views, and different proponents should try to make their positions as explicit as possible so people do not continue to talk past one another. It is perhaps not amiss here to note that the very words or terms used to designate the core nature of the phenomena are etymologically very complex, with major shifts in meaning through time (see Safire, 2005 who struggles with past and present etymological meanings of "disaster," "catastrophe," "calamity," and "cataclysm"; also see Murria, 2004, who looking outside the English language, found a bewildering set of words used, many of which had no equivalent meanings in other languages.) We are far from having standardized terms and similar connotations and denotations for them.

NEW KINDS OF DISASTERS AND CRISES

In the last decade or so, a conceptual question has been receiving increasing attention: Have new kinds of crises and disasters begun to appear?

Journalistic accounts of recent disasters raise that question at least intuitively. For example, massive computer system failures have occurred either through the insertions of viruses or as a result of mechanical problems in linked systems. There have been terrorist attacks of a magnitude and scale not seen before, widespread illnesses and health-related difficulties that appear to be qualitatively different from traditional medical problems, financial and economic collapses that cut across different social systems, space satellites and shuttles plunging into the Earth, large-scale serial sniper attacks as well as mass shootings and hostage takings, and animal health emergencies (e.g., mad cow disease) and vector-borne diseases not seen before.

Occurrences that seem to have both traditional and nontraditional features include the recent heat waves in Paris (Lagadec, 2004) and Chicago (Klinenberg, 2002) as well as ice storms such as in Canada (Scanlon, 1998b). Likewise, certain kinds of conflicts such as the

recent genocide-like violence in Africa and the former Yugoslavia appear to comprise both old and new features. These mixtures of old and new often catch mass media attention and generate governmental and nongovernmental organization (NGO) actions in ways that are different in major ways from what had been done in previous centuries.

Now it is not the responsibility of social scientists such as us to deal specifically with the most recent news bulletins. Such descriptive accounts are of research use only if they indicate something of a more general nature. One question along that line that can be raised here is whether or not the journalistic accounts are indicating that something of a more basic nature is happening.

The Chernobyl radiation fallout led some scholars and researchers to start asking if there was not something distinctively new about that disaster. The fallout was first openly measured in Sweden, where officials were very mystified in that they could not locate any possible radiation source in their own country. Later radiation effects on vegetation eaten by reindeer past the Arctic Circle in northern Sweden were linked to the nuclear plant accident in the Soviet Union. To some researchers, that raised questions of how local emergency planners and managers could have anticipated, in any risk analysis they might have undertaken, what actually happened. The mysterious origins, crossing of national boundaries, and the emergent involvement of many European and transnational groups, was not something researchers had typically seen in concert in earlier disasters. If this was true, then Chernobyl was a “focusing event,” something that calls into question previously held views (Birkland, 1997).

Looking back, it is clear that certain other disasters also should have alerted all of us to the probability that new forms of adversity were emerging. In November 1986, water used to put out fire in a plant involving agricultural chemicals spilled into the river Rhine. The highly polluted river went through Switzerland, Germany, France, Luxembourg, and the Netherlands. A series of massive fire smog episodes plagued Indonesia in 1997 and 1998. Land speculations led to fire clearing efforts that, partly because of drought conditions, resulted in forest fires that produced huge and thick smog hazes that spread over much of Southeast Asia (Barber & Schweithelm, 2000). These disrupted travel, which in turn affected tourism as well as creating respiratory health problems, and led to political criticism of Indonesia by other countries as multination efforts to cope with the problem were not very successful. Both of these occasions had characteristics that were not typically seen in traditional disasters.

We think it would be fair to say that most scholars and researchers interested in disasters and other crises generally agree that at present there are new types of risks and hazards as well as changes in social settings. If the world is increasingly being faced with nontraditional instances, what is the nature of such happenings? We address this question in the next section.

NATURE OF NEW HAPPENINGS

The two prime and initial examples we used in our analysis were the severe acute respiratory syndrome (SARS) and the SoBig computer F virus spread, both of which appeared in 2003. The first involved a “natural” phenomenon, whereas the second was intentionally created. Since much descriptive literature is available on both, we here provide only very brief statements about these phenomena.

The new infectious disease SARS appeared in the winter of 2003. Apparently jumping from animals to humans, it originated in southern rural China, near the city of Guangzhou. From there it moved through Hong Kong and Southeast Asia. It spread quickly around the world because international plane flights were shorter than its incubation period. At least 774

infected persons died. It particularly hit Canada with outbreaks in Vancouver in the West and Toronto far away in the East. In time, of the several hundred persons who became ill, 44 died and thousands of others were quarantined. The city's health care system virtually closed down except for the most urgent of cases, with countless procedures being delayed or canceled. This led to widespread anxiety in the area, resulting in the closing of schools, the cancellation of many meetings, and because visitors and tourists stayed away, a considerable negative effect on the economy (Commission Report, 2004, p. 28). The report notes a lack of coordination among the multitude of private and public sector organizations involved, a lack of consistent information on what was really happening, and jurisdictional squabbling on who should be doing what. Although SARS vanished worldwide after June 2003, to this day it is still not clear why it became so virulent in the initial outbreak and why it has disappeared (Yardley, 2005).

The SoBig computer F virus spread in August 2003. This was hardly the first deliberate insertion of an electronic virus into computer systems. The first occurred in 1981 (see <http://www.cknow.com/vtiter/vihistory.htm> for a comprehensive history of computer virus episodes). The SoBig worm carried its own SMPT mail program and used Windows® network shares to spread (Schwartz, 2003). Actually this virus was initially only one of a set of others that were circulating at the same time, but it soon became the dominant one in the world. It affected many computer systems and threatened almost all computers in existence. The damage was very costly in terms of use of time, effort, and resources. A variety of organizations around the world, public and private, attempted to deal with the problem. Initially uncoordinated, there eventually emerged in an informal way a degree of informational networking on how to cope with what was happening (Koerner, 2003).

What can we generalize from not only these two cases but also others that we looked at later? At one time, we identified a dozen different dimensions. In our more recent analyses we have reduced them to six. The characteristics we depict are stated in ideal typical terms, that is, from a social science perspective, what the phenomena would be if they existed in pure or perfect form.

First, the phenomena jump across many international and national/political governmental boundaries. There was, for example, the huge spatial leap of SARS from a rural area in China to metropolitan Toronto, Canada. In some instances, the phenomenon may spread to every possible target around the world, like the SoBig computer F virus did. It crosses functional boundaries, jumping from one sector to another, and crossing from the private into public sectors (and sometimes back).

Second, the phenomena spread very fast. Cases of SARS went around the world in less than 24 hours, starting with a person who had been in China and then flying to Canada, quickly infecting persons in Toronto. The spread of the SoBig F virus was called the fastest ever (Spread, 2003; Thompson, 2004). This quick spread is accompanied by a very quick if not almost simultaneous global awareness of the risk because of mass media attention. Despite this speed, however, at the start, the end of the happening's course is not clear cut.

Third, there is no known central or clear point of origin, at least initially, along with the fact that the possible negative effects at first are far from clear. This stood out when SARS first appeared in Canada. There is much ambiguity as to what might happen. Ambiguity is of course a major hallmark of disasters and crises (Tierney, 2005b), but it appears even more drastic in these newer cases.

Fourth, there are potentially if not actual large number of victims, directly or indirectly. The SoBig computer virus infected 30% of e-mail users in China, which is about 20 million people (Survey, 2003) and about three fourths of e-mail messages around the world were infected

by this virus (Koerner, 2003). In contrast to the geographic limits of most past disasters, the potential number of victims is often open ended in the newer ones.

Fifth, traditional local community “solutions” are not obvious. This is rather contrary to the current emphasis in emergency management philosophy. The prime and first locus of planning and managing cannot be the local community as it is presently understood. International and transnational organizations are typically involved very early in the initial response. The nation-state may not even be a prime actor in the situation.

Sixth, although responding organizations and groups are major players, there is an exceptional amount of emergent behavior and the development of many informal ephemeral linkages. In some respects the informal social networks generated, involving much information networking, are not always easily identifiable from the outside, even though they are often the crucial actors at the height of the crisis.

We call these phenomena “trans-system social ruptures” (TSSRs). This term is an extension of the earlier label of “social ruptures” advanced by Lagadec (2000). The longer phrase is used to emphasize the fact they jump across different societal boundaries, disrupting the fabric of different social systems.

POSSIBLE FUTURE TSSRS

If a disciplinary approach is worthwhile, it should be able to somewhat predict the future, something that the social sciences studying disasters have little attempted. In this section, we project several possible future scenarios that involve TSSRs. Even though some of the scenarios discussed might seem like science fiction, they are well within the realm of realistic scientific possibilities.

The first scenario is the possibility that asteroids or comets may hit the Earth (Di Justo, 2005). Of course, this has happened in the past, but even more recent impacts found no or relatively few human beings around. There are two major possibilities with respect to impact (McGuire, 2000; Wisner, 2004). A landing in the ocean would trigger a tsunami-like impact in coastal areas. Just thinking of the possibility of how, when, and where ahead of time coastal population evacuations might have to be undertaken is a daunting task. Statistically less likely is a landing in a heavily populated area. A terrestrial impact anywhere on land, however, would generate very high quantities of dust in the atmosphere, which would affect food production as well as creating economic disruption. This would be akin to the Tombora volcanic eruption in 1813, which led to very cold summers and crop failures (Post, 1977). The planning and management problems for handling an event like this that could be of a global nature would be enormous.

In recent times, the Soviet satellite, *Cosmos* broke up over Canada (Scanlon, 2001), and the Columbia space shuttle explosion scattered debris over a large part of the United States. Our brief examination of these more geographically limited instances suggests that they had many of the characteristics of TSSRs as could appear in a comet impact. They would present extraordinary disaster management problems. The space shuttle accident, for example, required that an unplanned effort coordinating organizations that had not previously worked with one another and other unfamiliar groups, public and private (ranging from the U.S. Forest Service to local Red Cross volunteers to regional medical groups), be informally instituted over a great part of the United States (Donahue, 2003). This clearly indicates characteristics of TSSRs if a real comet or asteroid impact occasion arose, with massive crossing of boundaries, very large number of potential victims, no local community “solutions” for the problem, and so forth.

A second scenario is the either inadvertent or deliberate creation of biotechnological disasters. Genetic engineering, whether of humans or food products, is currently in its infancy. The possible good outcomes and products from such activity are enormous (Morton, 2005) and are spreading throughout the world (Pollack, 2005). But this is a double-edged technology carrying the possibility of the severe consequences mentioned earlier. In fact, there is already dispute over genetically modified crops, with many European countries resisting and preventing their use and dissemination. While no major disaster or crisis from this biotechnology has yet occurred, there have been many accidents and incidents that suggest this will be only a matter of time. For example, in 2000, StarLink corn, approved only for animal feed, is found in the food supply, such as taco shells and other groceries. The same year, farmers in Europe learned that they had unknowingly been growing modified canola using mixed seed from Canada. In 2001, modified corn was found in Mexico even though it was illegal to plant in that country. That same year, experimental corn that had been engineered to produce a pharmaceutical was found in soybeans in Nebraska. In several places organic farmers found that it was impossible for them to keep their fields uncontaminated (for further details about these incidents and other examples see Pollack, 2004). Noticeable is the leaping of boundaries and indeterminate route of spreading. It does not take much imagination to see that a modified gene intended for restricted use could escape and create a contamination that could wreak ecological and other havoc.

Perhaps even more disturbing to some is genetic engineering involving humans. The worldwide debate regarding cloning, although currently perhaps more a philosophical and moral topic, does also partly involve the concern over creating flawed human-like creatures. It is possible to visualize disastrous worst-case scenarios that would not be too far-fetched.

Even when there is some prior knowledge of a very serious potential threat, what might happen is still likely to be as ambiguous and complex as when SARS first surfaced. This can be seen in the continuing major concern expressed in 2004 to mid-2006 about the possible pandemic spread of avian influenza, the so-called "bird flu" (Nuzzo, 2004; Thorson & Ekdahl, 2005). This illness has already appeared sporadically in at least 10 Asian countries, and worst case scenarios project that if it spread globally perhaps 30% of the world population would die. But its possible spread, effects, and whether protective measures available at present would be effective are so unknown that knowledge that it might occur provides very little guidance on what might actually happen.

The potential for a total or massive human catastrophe does exist. Global nuclear war could, either directly or indirectly, exterminate the human race. This is the implication of many of the nuclear war planning studies undertaken by the Federal Emergency Management Agency (FEMA) in the 1970s to the 1990s. It is also possible to visualize the destruction of all food supplies for humans either through the inadvertent or deliberate proliferation of very toxic biotechnological innovations for which no known barriers to spread exists. These types of potential global disasters are of relatively recent origin and we may expect more in the future (see Joy, 2000, a major pioneer in developing computer technology who points out that the human race is opening up potentially catastrophic possibilities by innovations in nanotechnology, genetic engineering, and robotics). A potential is not an actuality. But it would be foolish from both a research as well as planning and managing aspects to simply ignore these and other doomsday possibilities.

The question might be asked if there is an inherent professional bias among disaster and crisis researchers and emergency planners to look for and to expect the worst (see Mueller, 2004, for numerous examples). As sociological studies of occupations have found, the perception and thinking of job incumbents tends to place the work activity of such persons at the center of

their social and psychological worlds. On the positive side, this often enables them to discount popular but incorrect assumptions and beliefs about the phenomena they study or deal with a daily basis. However, on the negative side, they tend to look intensively for problematical issues and to overstate worst case scenarios. In a term advanced a century ago by Veblen, they tend to develop a “trained incapacity” to see other than expected phenomena.

In the disaster and crisis area, this orientation is reinforced by the strong tendency of social critics and intellectuals focused on social issues to stress the negative. For example, a recent publication by a cosmologist at Cambridge University (Rees, 2004) gives civilization as we know it only a 50–50 chance of surviving the 21st century. Some of these kinds of statements are very parallel to news stories in general, where attention is focused on what could or did go wrong; along with no journalistic accounts about nothing happening and few about positive outcomes (Fischer, 1998a; Gans, 1980; Gitlin, 1980; Quarantelli, 2002c; Smith, 1992; Walters, Wilkins, & Walters, 1989; Wenger, 1985; Wenger & Quarantelli, 1989).

Let us note two cases where predictions were made about disaster and crises occasions. When the Mt. St. Helens volcano erupted on May 18, 1980 it leveled hundreds of square miles of forests, spawned mudflows that ran into the shipping channel of the nearby Columbia River, and killed almost all plant and animal life in a large area that was buried under ash and debris. The surrounding landscape was almost totally barren and devoid of almost any kind of life. Experts stated that the environment in the affected area would take centuries to recover. However, 25 years after the eruption, and without any effort by people to restore the area, the original species of trees, plants, birds, and animals have come back and are flourishing more robustly than at the time of the disaster. In fact, the revival was marked by the appearance of 70 species of birds new to the area (LaCorte, 2005).

Similarly, Hiroshima, the target of the first atomic bomb, was not only physically destroyed but a huge number of people, perhaps 100,000, people, were killed as well (although the actual number of casualties is in dispute; see Quarantelli, 2001b). In the museum that now exists at the exact point where the bomb fell, there is a 360-degree photograph of the zone around that point, taken a few days after the attack. Except for a few piles of ruins, there is nothing but rubble as far as the eye can see in every direction. Some believed this scene would not change for decades. But a visitor to the museum today can see in the windows behind the circular photograph many signs of a bustling city and its population (for a description of the museum see Davis & Quarantelli, 2006). Hiroshima, unlike the Mt. St. Helens area, did receive much aid to rebuild. But both came back in ways that observers at the time of impact did not foresee. (For a description of the immediate post-impact devastation in Nagasaki, see Hall, 2005).

Likewise, who would have predicted that starting in 2000, the Russians could organize tours to visit the dead zones around the Chernobyl nuclear plant? This takes place around the very site of the plant and the nearby abandoned city of Pripjat, where radiation readings are still dangerously high (Chiyers, 2005).

It sometimes helps to look at the past, see what was projected at a particular time, and then look at what actually happened. The worldwide expectations about what would happen at the turn of the century to computers are now simply remembered as the Y2K fiasco. It would be a worthwhile study to take projections by researchers about the future of ongoing crises and disasters, and then to look at what actually happened. In the 1960s, in the United States, scholars made rough projections about the immediate future course of racial and university riots in the country. Not only had their initial appearances not been forecast, but also their record in predicting how such events would unfold was dismal (apparently no one had foreseen that the riots would go from ghetto areas to university campuses), as well as that they rather abruptly stopped. We should be able to do a better job than we have so far in making projections

about the future. But perhaps that is asking more of disaster and crisis researchers than is reasonable. After all, social scientists with expertise in certain areas, to take recent examples, failed completely to predict or forecast the nonviolent demise of the Soviet Union, the peaceful transition of blacks taking over the government of South Africa, or the development of a market economy in communist China.

THE DIFFERENTIATED AND CHANGING SOCIAL SETTING

A disaster or crisis always occurs in some kind of social setting. By social setting we mean social systems. These systems can and do differ in social structures and cultural frameworks.

The extreme differences around the world are not always noted. For instance, at present the lives of some individuals mostly revolve around cyberspace and the high tech world (see any issue of *Wired Magazine* for examples of this). They have every new gadget that can inform them about the world. At the other extreme are the residents of the Andaman Islands who live at a level many would consider “primitive.” Thus, at the time of the recent tsunami in Southeast Asia they had no access to modern warning systems. But before the tsunami, members of the tribal communities saw signs of disturbed marine life and heard unusual agitated cries of sea birds. This was interpreted as a sign of impending danger, so that part of the population got off the beaches and retreated inland to the woods and survived intact (Tewari, 2005; <http://www.tsunami2004-india.org>). Even in the middle of highly urban societies there can be isolated social groups such as the Amish communities close to Three Mile Island who did not learn of the accident at the nuclear plant until many days later.

The social setting is very important. But whose setting is involved? That could be looked at in different ways, but for our purposes here, we will be speaking primarily of differences at the societal level.

There has been a bias in disaster and crisis research toward focusing on specific agents and specific events. Thus, social science researchers are sometimes inclined to say they studied this or that earthquake, flood, explosion, and/or radioactive fallout. At one level that is irrelevant. The terms refer to geophysical, climatological, or physical occurrences, which are hardly the province of social scientists. Instead those focused on the social in the broad sense of the term should be studying social phenomena. Our view is that what should be looked at more is not the possible agent that might be involved, but the social setting of the happening. This becomes obvious when researchers have to look at, for example, the recent Southeast Asia tsunami or locust infestations in Africa. Both of these occasions impacted a variety of social systems as well as involving social actors from outside those systems. This led in the tsunami disaster to sharp cultural clashes regarding how to handle the dead between Western European organizations who came in to look mostly for bodies of their tourist citizens and local groups who had different beliefs and values with respect to dead bodies (Scanlon, personal communication).

That given, there is a need to look at both the current social settings as well as certain social trends that influence disasters and crises. In do not address all aspects of social systems and cultural frameworks or their social evolution, either past or prospective. Instead we will selectively discuss and illustrate a few dimensions that appear particularly important with respect to crises and disasters.

What might these be? Let us first look at existing social structures around the world. What differences are there in authority relationships, social institutions, and social diversity?

As examples we might note that Australia and the United States have far more decentralized governments than do France or Japan (Bosner, 2002; Schoff, 2004). This affects what might or might not happen at times of disasters. For instance, given the research evidence that top-down systems have more problems in responding, it might have been expected, as did occur, that there would be a considerable delay in the central government response to the earthquake in the Kobe area in Japan (see the chapter on national planning and response by Britton in this handbook, where he extensively discusses Japanese disaster planning and managing; see also Nakamura, 2000).

As another example, a mass media system exists in almost all societies, but even with the same technologies this social institution operates in rather different ways in China compared with Western Europe. This is especially important because to a considerable extent the mass communication system is by far the major source of “information” about a disaster or a crisis (see the chapter by Scanlon in this handbook). In major ways, it socially constructs disasters and crises. This is partly illustrated by the fact that in the former Soviet Union even major disasters and overt internal conflicts in the form of riots were simply not openly reported (Berg, 1988). And only late in 2005 did Chinese authorities announce that henceforth death tolls in natural disasters would be made public, but not for other kinds of crises (Kahn, 2005).

Finally, another social structural dimension has to do with the range of social diversity in different systems. Social groupings and categories can be markedly different in their homogeneity or heterogeneity. The variation, for instance, can be in terms of life styles, class differences, or demographic composition. The aging population in Western Europe and Japan is in sharp contrast to the very young populations in most developing countries. Thus, 21% of the population in the United States is younger than 15 years of age, in contrast to Iran where the figure is 30% or India, where it is 36%. This is important, because the very young and the very old disproportionately incur the greatest number of fatalities in disasters. (For class and ethnic diversity in different societies and their effects on disaster preparedness, response and recovery, see the chapter by Bolin in this handbook.)

Human societies also differ in terms of their cultural frameworks. As anthropologists have pointed out, they can have very different patterns of beliefs, norms, and values. As one example, there can be widely held different conceptions of what occasions are designated as disasters and crises. The source can be attributed to supernatural, natural, or human factors as indicated earlier. This can markedly affect everything from what mitigation measures might be considered to how recovery and reconstruction will be undertaken.

Norms indicating what course of action should be followed in different situations can vary tremendously. For example, the norm of helping others outside of one’s own immediate group at times of disasters and crises ranges from full help to none. Thus, although the Kobe earthquake was an exception, any extensive volunteering after disasters was very rare in Japan (for a comparison of the United States and Japan in this respect, see Hayashi, 2004). In societies with extreme cross-cultural ethnic or racial differences, volunteering to help others outside of one’s own group at times of disasters or crisis is almost unknown.

Finally, much of what is valued can differ substantially. For instance, even the value of doing disaster research and implementing findings from studies varies from one culture to another. This activity is valued very highly in the United States compared to, say, Indonesia, with Russia falling somewhat in between.

Social structures and cultural frameworks of course are always changing. To understand future disasters and crises, it is necessary to identify and understand trends that may be operative with respect to both social structures and cultural frameworks. In particular, for our purposes, it is important to note trends that might be cutting across structural and cultural boundaries.

At the structural level, one notable ongoing change is what has been called globalization. Leaving aside the substantive disputes about the meaning of the term, what is involved is at least the increasing appearance of new social actors at the global level. For example, with respect to disaster relief and recovery there is the continuing rise of transnational or international organizations such as UN entities, religiously oriented groupings, and the World Bank. With the decline of the importance of the nation-state (Guehenno, 1995; Mann, 1997), more and new social actors, especially of an NGO nature, are to be anticipated.

A case can also be made that a variety of informal social networks have developed that globally cut across political boundaries, and that this will increase in the future. A clear example is the popular culture that appeals to the young, with ties and links that cut across most national boundaries. Some anti-American insurgent groups around the world can be seen wearing T shirts or caps that carry the names of music and sport groups in the United States. More important for the disaster and crisis areas is that such informal networks also are increasing in trade, science, and communications, to mention but a few examples (Quarantelli, 2002c). Such networks are creating a social capital (in the social science sense) that will be increasingly important in dealing with disasters and crises.

Among trends at the cultural level is the greater insistence of citizens that they ought to be actively protected against disasters and crises (Beck, 1999). This is part of a democratic ideology that has increasingly spread around the world. It is particularly surfacing in developing countries such as Turkey where recent disasters have evoked popular discontent and demonstrations that were unheard of before.

Finally, the 9/11 attacks, have clearly been a “focusing event” (as Birkland, 1997, uses the term), especially for official thinking not just in the United States but in other countries as well, and changed along some lines, certain values, beliefs, and norms (Smelser, 2004; Tierney, 2005b). There is a tendency, at least in the United States after 9/11, to think that all future crises and disasters will be new forms of terrorism. One can see this in the creation of the U.S. Department of Homeland Security, which is often repeating approaches and methods of thinking that the last 50 years of research have shown to be erroneous (e.g., an imposition of a command and control model, assuming that citizens will react inappropriately to warnings, seeing organizational improvisation as bad managing, etc.; see Dynes, 2003). Some of these problems surfaced during Hurricane Katrina. The changes have been in addition accompanied by the downgrading of FEMA and its emphasis on mitigation (Cohn, 2005). In fact, FEMA now has responsibility only for disaster response, with preparedness being incorporated in a general directorate that will clearly spend more time and effort on terrorism rather than disasters. There is also a growing clash between a disaster focus and a terrorism focus, with the latter leading to actions that will make disasters more likely (Drew, 2005). Whether valid or not, these ideas will heavily influence thinking about disasters and crises, at least in the near future and not just in the United States.

Overall, the existing social structures and cultural frameworks as well as changes going on in both, have to be taken into account in any further thinking about disasters and crises. These dimensions affect the larger social settings in which a disaster or crisis occurs. In saying this we are at least indirectly implying why disasters and crises have changed through time. To go from depicting characteristics to the conditions that generate these characteristics requires going considerably beyond, for example, the growing importance of informal networks or the also increasing expectations of citizens that some organization, such as the state, has responsibility to protect them against threats.

The ideas expressed in the preceding text and the examples used were intended to make several simple points. Given their validity, they suggest, for instance, that an earthquake in

France of the same magnitude as one in Iran will probably be reacted to differently. A riot in Sweden will be a somewhat different phenomenon than one in Myanmar. To understand and analyze such happenings requires taking into account the aspects just discussed. It is hard to believe that countries that currently have no functioning national government, such as Somalia and the Congo or marginally operative ones such as Afghanistan, will have the same reaction to disasters and crises as societies with fully functional national governments. Different kinds of disasters and crises will occur in rather different social settings. In fact, events that today are considered disasters or crises were not necessarily so viewed in the past.

In noting these cross-societal and cross-cultural differences, we are not saying that there are no universal principles of disaster and crisis behavior. Considerable research evidence supports this notion. We would argue, for example, that many aspects of effective warning systems, problems of bureaucracies in responding, and the crucial importance of the family/household unit are roughly the same in all societies. To suggest the importance of cross-societal and cross-cultural differences is simply to suggest that good social science research needs to take differences into account while at the same time searching for universal principles about disasters and crises. This is consistent with disaster researchers and scholars (e.g., Oliver-Smith, 1994) who have argued that studies in these areas have seriously neglected the historical context of such happenings, what we have called the social setting. Of course, this neglect of the larger and particularly historical context has characterized much social science research of any kind (Wallerstein, 1995); it is not peculiar to disaster and crisis studies.

SOCIAL AMPLIFICATION OF DISASTERS AND CRISES

The last section brings us to a consideration of other crises and disasters that only partly share the characteristics of TSSRs. Many crises and disasters have old or traditional characteristics, but nevertheless are new in some important aspects. These represent cases of what we will call the social amplifications of crises and disasters (SACD). Others initially developed an idea about a social augmentation process with respect to risk (see especially Pidgeon, Kasperson, & Slovic, 2003). To them, risk depends not only on the character of the dangerous agent itself but also on how it was seen in the larger context in which it appeared. The idea that there can be social amplification of risk rests on the assumption that aspects relevant to hazards interact with processes of a psychological, social, institutional, and cultural nature in such a manner that they can increase or decrease perceptions of risk (Kasperson & Kasperson, 2005). It is important to note that the perceived risk could be raised or diminished depending on the factors in the larger context, which makes it different from the vulnerability paradigm which tends to assume the factors involved will be primarily negative ones. We have taken this idea and extended it to the behaviors that appear in disasters and crises. Hence besides the development of new agents or hazards or risks as can be seen in TSSRs, there are also the existing social settings as well as changes in them that crucially affect if and how some crises and disasters will occur and be perceived.

Extreme heat waves and massive blizzards are hardly new weather phenomena (Burt, 2004). The historical record as well as contemporary studies on the social aspects of such happenings is surprisingly sparse (Hewitt & Burton, 1971; International Federation of Red Cross and Red Crescent Societies, 2004, p. 37–55; Koppe, Kovacs, Jendritzky, & Menne, 2004; Sheehan & Hewitt, 1969;). As climatological hazards they have been around as long

as the human race, and in that respect, like blizzards and cold waves, they have very old antecedents (for statistical data see Burt, 2004).

Two recent heat waves, however, have contained new elements. In 2003, a long lasting and very intensive heat wave battered France. Nearly 15,000 persons died (and perhaps 22,000 to 35,000 in all of Europe). Particularly noticeable was that the victims were primarily socially isolated older persons. Another characteristic was that officials were very slow in accepting the fact that there was a problem and so there was very little initial response (Lagadec, 2004). A somewhat similar earlier incident occurred in 1995 in Chicago that was not much noticed until reported in a study 7 years later (see Klinenberg, 2002). It exhibited some of the same features, that is, older isolated victims, bureaucratic indifference, and mass media uncertainty.

At the other temperature extreme, in 1998, Canada experienced an accumulation of snow and ice that went considerably beyond the typical. The ice storm heavily impacted electric and transport systems, especially around Montreal. The critical infrastructures that were affected created chain reactions that reached into banks and refineries. At least 66 municipalities declared a state of emergency. Such a very large geographic area was involved that many police were baffled that “there was no scene” that could be the focus of attention (Scanlon, 1998b). There were also many emergent groups and informal network linkages (Scanlon, 1999a).

In some ways, this was similar to what happened in August 2003, when the highly interconnected eastern North American power grid started to fail when three transmission lines in the state of Ohio came into contact with trees and short circuited (Townsend & Moss, 2005). This created a cascade of power failures that resulted in blackouts in cities from New York to Toronto and eventually left around 50 million persons without power, which, in turn, disrupted everyday community and social routines (Ballman, 2003). It took months of investigation to establish the exact path of failure propagation through a huge, complex network. Telecommunication and electrical infrastructures entwined in complex interconnected and network systems spread over a large geographic area with multiple end users. Therefore, localized disruptions can cascade into large-scale failures (for more details, see Townsend & Moss, 2005).

Such power blackouts have recently become very common. They occurred, among other areas, in Auckland, New Zealand in 1998 (Newlove, Stern, & Svedin, 2002); in Buenos Aires in 1999 (Ullberg, 2004); in Stockholm in 2001 and 2002; in Siberian cities in 2001 (Humphrey, 2003); and in Moscow in 2005 (Arvedlund, 2005). All of these cases initially involved accidents or software and hardware failures in complex technical systems that generate severe consequences, creating a crisis with major economic and often political effects. These kinds of crises should have been expected. Even two decades ago, a National Research Council report (1989) forecast the almost certain probability of these kinds of risks in future network linkages.

Blackouts can also be deliberately created either for good or malevolent reasons unrelated to problems in network linkages. Employees of the now notorious Enron energy company, to exploit Western energy markets, indirectly but deliberately took off line a perfectly functioning Las Vegas power plant so that rolling blackouts hit plant-dependent northern and central California, with about a million residences and businesses losing power (Peterson, 2005). In the earliest days of electricity in New York City, the mayor ordered the power cut off when poor maintenance of exposed and open wires resulted in a number of electrocutions of citizens and electrical workers (Jonnes, 2004). One should not think of blackouts as solely the result of mechanical or physical failures creating chain-like cascades.

These examples are not quite TSSRs but neither do they represent the older or more traditional types. It is the social setting in which they occur that determines their characteristics (this is consistent with similar thinking expressed in Wisner, Blaikie, Cannon, & Davis, 2004). The social settings are more complex and differentiated than ever before, so SACDs are more

frequent than ever before. In fact, these in-between types may be more common than TSSRs. We believe SACDs can be expected in the future and probably at an accelerating rate.

THE FULL RANGE OF ALL DISASTERS AND CRISES

Where do TSSRs and SACDs fit into the full range of all disasters and crises? We have already indicated that we see TSSRs as adding to the complex of such events rather than replacing them. That said, our view is that we should think of disasters and crises as falling into one of three conceptual categories: old, new, and in-between types. In this section we discuss old ones, making a case that most disasters are still traditional ones.

In the United States in 2004, there were 78 federally declared disasters (as well as 43 fire management assistance declarations). While we did not examine closely all these occurrences, we did look at some very closely.

For example, four major hurricanes hit the state of Florida that year (for an epidemiologic survey of residents in the state, see Centers for Disease Control [CDC], 2005). We saw very little in what we found that required thinking of them in some major new ways, or even in planning for or managing them. The problems, individual or organizational, that surfaced were the usual ones, and how to handle them successfully is fairly well known. More important, emergent difficulties were actually somewhat better handled than in the past, perhaps reflecting that officials may have had exposure to earlier studies and reports. Thus, the warnings issued and the evacuations (one third of those surveyed) that took place were better than in the past. Looting concerns were almost nonexistent and fewer than 10% of people showed possible mental health effects. The pre-impact organizational mobilization and placement of resources beyond the community level was also better. The efficiency and effectiveness of local emergency management offices were markedly higher than in the past. Not everything was done well. Long known problematical aspects and failures to implement measures that research had suggested a long time ago were found. There were major difficulties in interorganizational coordination. The recovery period was plagued by the usual problems. Even the failures that showed up in pre-impact mitigation efforts were known.

From our viewpoint, the majority of contemporary disasters in the United States are resemble most of the earlier ones. What could be seen in the 2004 hurricanes in Florida was rather similar to what the DRC had studied there in the 1960s and the 1970s. As the electronic age advances beyond its infancy and as other social trends continue (e.g., the already mentioned aging of the population), new elements may appear, creating new problems that will necessitate new planning. If and when that happens, we may have new kinds of hurricane disasters, but movement in that direction will be slow.

Apart from the Florida events, we can also report what the senior author of this chapter recently experienced in his local area. As the famous sociologist Herbert Blumer used to say in his class lectures a long time ago, it is sometimes useful to check whatever is theoretically proposed against personal experience. In 2005, an extensive snowstorm led to the closing of almost all schools and government offices in the state of Delaware. This was accompanied by the widespread cancellations of religious and sports events. Air, road, and train service was disrupted across the board. All of this resulted in major economic losses in the million of dollars. There were scattered interruptions of critical life systems. The governor issued a state of emergency declaration and the state as well as local emergency management offices fully mobilized. To be sure, what happened did not rival what surfaced in the Canadian blizzard

discussed earlier. But it would be difficult to argue that it did not meet criteria often used by many to categorize disasters. For example, it met two of the criteria the CRED uses to identify a disaster, any one of which is enough for the classification: declaration of state of emergency and 100 persons affected. (But it did not show up in the CRED statistics!) Equally important, what happened was not that different from what others and we had experienced in the past. In short, it was a traditional disaster.

Finally, at the same time we were thinking about the Florida hurricanes and the Delaware snowstorm, we also observed other events that many would consider disasters or crises. Certainly, a BP Texas plant explosion in 2005 would qualify. It involved the third largest refinery in the country that produces about 3% of the U.S. gasoline supply. More than 100 people were injured and 15 died. In addition, refinery equipment was physically destroyed and nearby buildings were leveled. There was full mobilization of local emergency management personnel (Franks, 2005). At about the same time, there were landslides in the states of Utah and California; a stampede with hundreds of deaths in a Bombay, India temple; train and plane crashes in different places around the world, as well as large bus accidents; a dam rupture that swept away five villages, bridges, and roads in Pakistan; recurrent coal mine accidents and collapses in China; recurrent false reports in Asia about tsunamis that greatly disrupted local routines; sinking of ferries with many deaths; and localized riots and hostage takings. At least based on press reports, it does not seem that there was anything distinctively new about these occasions. They seem to greatly resemble many such prior happenings.

It does not appear to us that TSSRs and SACDs will totally supersede at least the more circumscribed and localized crises and disasters that will continue to have traditional characteristics, including the need to be handled at the local community level. Unless current social trends change very quickly in hypothetical directions (e.g., marked changes as a result of biotechnological advances), for the foreseeable future there will continue to be many rather old and traditional local community disasters and crises (such as localized floods and tornadoes, hostage takings or mass shootings, exploding tanker trucks or overturned trains, circumscribed landslides, disturbances if not riots at local sport venues, large plant fires, sudden discoveries of previously unknown very toxic local waste sites, most airplane crashes, stampedes and panic flights in buildings, etc.).

Mega-disasters and global crises will be rare in a numerical and relative sense, although they may generate much mass media attention. For example, recent terrorist attacks on the Madrid and London train systems were certainly major crises and symbolically very important, but numerically there are far more local train wrecks and collisions every day in many countries in the world. The more localized crises and disasters will continue to be the most numerous, despite ever increasing TSSRs and SACDs. Overall, the world is faced with a mixture of old, new, and in-between types of disasters and crises, but numbers of each type are far from equal.

IMPLICATIONS

What are some of the implications for planning and managing that result from taking the perspective we have suggested about crises and disasters? If our descriptions and analyses of such happenings are valid, there would seem to be the need at least for some new kinds of planning for and managing of TSSRs and SACDs. Nontraditional disasters and crises require some nonconventional processes and social arrangements. They demand innovative thinking “outside of the box” as Lagadec (2005) has frequently said (see also Boin & Lagadec, 2000).

This does not mean that everything has to be new. As said earlier, all disasters and crises share certain common dimensions or elements. For example, if early warning is possible at all, research has consistently shown that acceptable warnings have to come from a legitimately recognized source, have to be consistent, and have to indicate that the threat or risk is fairly immediate. These principles would seem to apply also to TSSRs and SACDs, although other measures might be necessary.

Actually, if the older types of risks and hazards and their occasional manifestations in crises and disasters were all we needed to be worried about, we would be in rather good shape. As previously mentioned, few threats actually manifest themselves in disasters. For example, in the 14,600 plus tornadoes appearing in the United States between 1952 and 1973, only 497 involved casualties, and 26 of these occasions accounted for almost half of the fatalities (Noji, 2000). Similarly, it was noted in 1993 that while about 1.3 million people had been killed in earthquakes since 1900 more than 70% of them had died in only 12 occurrences (Jones, Noji, Smith, & Wagner, 1993, p. 19).

That said, we can also say that the older risks and hazards and their relatively rare manifestations in crises and disasters are being coped with much better than they ever were even just a half-century ago. For example, there has been a remarkable reduction in certain societies of fatalities and even property destruction in some natural disaster occasions associated with hurricanes, floods, and earthquakes (see Scanlon, 2004, for data on North America). In the conflict area, the outcomes have been much more uneven, but even here, for example, the recurrence of world wars seems very unlikely.

But given that, are their certain aspects about coping that are more distinctive of SACDs and TSSRs? Certainly all kinds of specific practical questions might be asked. For example, let us assume that a health risk is involved. If international cooperation is needed, who talks with whom about what? At what time is action initiated? Who takes the lead in organizing a response? What legal issues are involved? (For example, if health is the issue, can health authorities close airports?) There might be many experts and much technical information around; if so, and they are not consistent, whose voice and ideas should be followed? What should be given priority? How could a forced quarantine be enforced? What of ethical issues? Who should get limited vaccines? What should the mass media be told and by who and when? (Boin, t'Hart, Stern, & Sundelius, 2005).

Let us move on to a more general level of planning and managing. We briefly indicate, almost in outline form, half a dozen principles that ought to be taken into account by disaster planners and crisis managers. (However, for a much fuller discussion about planning for and managing newer crises see the chapter by Lagadec in this handbook).

First, a clear distinction should be made between the planning and managing processes. As these terms are used in the literature, planning really refers to the strategies that need to be used in a situation. Managing has reference to the tactics that might be used in dealing with contingencies. There is a low correlation between planning and managing in the first place, even for traditional crises and disasters. But in newer kinds of disasters and crises, there are likely to be, for reasons already indicated, far more contingencies present in the situation. That is why even more of a focus on managing is needed.

Second, the appearance of much emergent social phenomena (groups and behaviors) needs to be taken into account. The reason for such emergence is that they arise in response to "unmet demands" in the situation (this happened most recently in the search for the Columbia shuttle pieces as discussed in Donahue, 2003). There are always new or emergent groups at times of major disasters and crises, but in SACDs and TSSRs they appear at a much higher rate.

Networks and network links also have to be particularly taken into account. There is a tendency to think of groups and interorganizational links. That is appropriate for traditional types of disasters. However, in TSSRs and SACDs these are less important than the informal networking that occurs. Research on this topic is considerably helped these days by the existence of a relatively recent body of literature including professional journals (e.g., *Global Networks: A Journal of International Affairs*).

Third, there is the need to be imaginative and creative. SACDs and TSSRs create new and higher level problems as a result of the dimensions and characteristics of these events. Hurricane Katrina, which was more a catastrophe than a disaster, might seem to suggest such challenges are almost impossible to meet. However, that is not the case. A good example is found in the immediate aftermath of 9/11 in New York. In spite of the total loss of the New York City Office of Emergency Management and its EOC facility, a completely new EOC was established elsewhere and started to operate very effectively within 72 hours after the attack. There had been no planning for such an event, yet around 750,000 persons were evacuated by water transportation from lower Manhattan (Kendra, Wachtendorf, & Quarantelli, 2003). These are not minor examples of what can be done.

Fourth, exercises and simulations of disasters and crises must have built-in contingencies (Boin, Kofman-Bos, & Overdijk, 2004). Most such training and educational efforts along such lines are designed to be like scripts for plays. That is a very poor model to use. Many contingencies exist in TSSRs and SACDs; therefore similar unexpected happenings should be built into exercises and training (Perry, 2004). Realistic contingencies, unknown to most of the players in the scenarios, make thinking through unconventional options imperative.

Fifth, planning should be with citizens and their social groups, and not for them. There is no such thing as the “public” in the sense of some homogenous entity (Blumer, 1948). There are only individual citizens and the groups of which they are members. The perspective from the bottom up is crucial to getting things done. This has nothing to do with democratic ideologies; it has instead to do with getting effective and efficient planning and managing of disasters and crises. Related to this is that openness with information rather than secrecy is mandatory. This runs against the norms of most bureaucracies and other organizations. The more information the mass media and citizens have, the better they will be able to react and respond (Wagman, 2003). However, all this is easier said than done. For example, even in modern urban areas, there typically are a variety of “of information receivers” so that all “do not seek information in the same way, using the same language or the same cultural reference frames” (Castenfors & Svedin, 2001, p. 251). Nevertheless, in the United States in 2005 a bill was introduced in Congress, *The Ready, Willing, and Able Act*, which calls for the establishment of a time-limited working group composed of federal government officials and Citizen Corps Council members to establish standards for having citizens work in close collaboration with local government officials, health authorities, emergency managers, and professional responders to develop and modify community based disaster preparedness, response, recovery, and mitigation plans.

Finally, there is a need to start thinking of local communities in ways different than they have been traditionally viewed. Up to now communities have been seen as occupying some geographic space and existing in some chronological time. Instead, we should visualize the kinds of communities that exist today are in cyberspace. These newer communities must be thought of as existing in social space and social time. Viewed this way, the newer kinds of communities can be seen as very important in planning for and managing disasters and crises that cut across national boundaries. To think this way requires a moving away from the traditional view of communities in the past. This will not be easy given that the traditional

community focus is strongly entrenched in most places around the world (see United Nations, 2005). But “virtual reality communities” will be the social realities in the future.

LOOKING AT THE FUTURE OF THE FUTURE

Assuming that what we have written has validity, what new research should be undertaken in the future on the topic of future disasters and crises? In previous pages we suggested some future studies on specific topics that would be worthwhile doing. However, in this section we outline research of a more general nature.

For one, practically everything we discussed ought to be looked at from the aspect of different cultures and societies. As mentioned earlier, there is a bias in our perspective that reflects our greater familiarity with and awareness of examples from the West (and even more narrowly Western Europe, the United States, and Canada). In particular there is a need to undertake research in developing as opposed to developed countries, which includes at least some analyses by researchers and scholars from the very social systems that are being studied. The different cultural perspectives that would be brought to bear might be very enlightening, and enable us to see things that we do not see at present, being somewhat a prisoner of our own culture.

Second, here and there in this chapter, we have alluded to the fact that it is more important to study the conditions that generate disasters and crises than it is to specify characteristics of the phenomena that are being studied. But there has to be at least some understanding of the nature of X before there can be a serious turn to ascertaining the conditions that generate X. We have taken this first step in this chapter. Future work should focus more on the generating conditions. A general model would involve the following ideas. The first is to look at social systems (societal, community, and/or organizational ones), and to analyze how they have become more complex and tightly coupled. The last statement would be treated as a working hypothesis. If that turns out to be true, it could then be hypothesized that systems can break down in more ways than ever before. A secondary research thrust would be to see if systems also have developed ways to deal with or cope with threatening breakdowns. As such, it might be argued that what ensues is an uneven balance between resiliency and vulnerability.

In studying contemporary trends, particular attention might be given to demographic ones. It would be difficult to find any country today where the population composition is not changing in some way. The increasing population density in high-risk areas seems particularly important in possible TSSRs and even more so for SACDs. Another value in doing research on this topic is that much demographic data are of a quantitative nature.

Although we have discussed a variety of examples of TSSRs and SACDs, there are other possibilities we have noted only in passing. In particular, we mentioned financial and economic collapses cutting across different systems. A good example would be the collapse in 1998 of the private Long Term Capital Management hedge fund that operated internationally. As a result of a major brokerage house pulling out of the fund, a sudden Russian moratorium on its debt, and other complex financial transactions, a downward chain reaction started. Its deterioration in September of that year threatened to destabilize not only stock markets around the world, but global financial systems in general. To prevent this, a consortium of domestic and foreign banks and brokerage firms, unofficially led by the U.S. Federal Reserve, informally generated three and a half billion dollars in cash to prevent an immediate collapse (Lowenstein, 2004).

How can this financial collapse conceivably be thought of as comparable in any way to natural disasters and crises involving conflict? One simple answer is that for nearly a hundred

years, one subfield of sociology has categorized, for example, panic flight in theater fires and financial panics as generic subtypes within the field of collective behavior (Blumer, 1939; Smelser, 1963). Both happenings involve new, emergent behaviors of a nontraditional nature. In this respect, scholars long ago put both types of behavior into the same category. Although disaster and crisis researchers have not looked at financial collapses, perhaps it is time that they did so, and particularly to examine if these are other instances of TSSRs. These kinds of happenings seem to occur very quickly, have ambiguous consequences, cut across political and sector boundaries, involve a great deal of emergent behavior, and cannot be handled at the community level. In short, what must be sought are genotypic characteristics, not phenotypic ones (see the chapter by Perry in this handbook). If whales, humans, and bats can all be usefully categorized as mammals for scientific research purposes, maybe students of disasters should also pay less attention to phenotypic features. If so, should other disruptive phenomena such as AIDS also be approached as disasters? Our overall point is that new research along the lines indicated might lead researchers to see phenomena in ways that are different from the way they had seen these in the past.

Finally, we have said little about the research methodologies that might be necessary to study TRRSs and SACDs. Up to now, disaster and crisis researchers have argued that the methods they use in their research are indistinguishable from those used throughout the social sciences. The methods are simply applied under circumstances that are relatively unique (Stallings, 2002).

In general, we agree with that position. But two questions can be raised. First, if social scientists venture into such areas as genetic engineering, cyberspace, robotics, and complex infectious diseases, do they need to have knowledge of these phenomena to a degree that they presently do not have? We have to confess that at times we have been uneasy trying to understand the SARS phenomena, which we had not experienced in studying disasters associated with earthquakes or chemical explosions. This may suggest the need for interdisciplinary research. Perhaps it also indicates that social scientists ought to expand their knowledge base before venturing to study certain disasters and crises, especially the newer ones. In the sociology of science there have already been studies of how researchers from rather different disciplines studying one research question interact with one another and what problems they have. Researchers in the disaster and crisis area should look at these studies. Even better, research might be conducted along these lines on social scientists that have or are specifically studying TSSRs or SACDs. We are not aware that there has been even one such study done anywhere.

Possibly more important, greater use should be made of the newer technologies that are currently available. Social scientists generally and students of disasters and crises in particular have done very little to take advantage of ever increasing computer and related technologies such as digital cameras and cell phones or electronic journals, to gather, analyze, and report findings. If we are going to study computer system disasters, would it not be appropriate to use computers as much as possible in such studies? (For specific suggestions, see Quarantelli, 2005a, pp. 359–366.)

CONCLUSIONS

Our view is that the area of disasters and crises is changing. In addition to the traditional kinds, we see an ever-increasing number of new and mixed crises and disasters. It is therefore likely that there will be both qualitative and quantitative changes of a negative nature.

Although this might seem to be a very pessimistic outlook, it is not the case. There is reason to think, as we tried to document earlier, that human societies in the future will be able to cope with whatever new risks and hazards come into being. To be sure, given hazards and risks, there are bound to be disasters and crises. A risk-free society has never existed and will never exist. But although this is undoubtedly true in a general sense, it is not so with reference to any particular or specific case. In fact, the great majority of potential dangers never manifest themselves eventually in disasters and crises.

Finally, we note again that the approach in this chapter has been a heuristic one. We have not implied that we have absolute and conclusive research-based knowledge or understanding about all of the issues we have discussed. This is in line with Alexander, who recently wrote that scientific research is never ending in its quest for knowledge, rather than trying to reach once-for-all final conclusions, and therefore “none of us should presume to have all the answers” (2005, p. 97).