THE DISASTERS OF THE 21ST CENTURY: A MIXTURE OF NEW, OLD, AND MIXED TYPES*

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Abstract

Disasters are as old as when human beings started to live in groups. Initially the hazards, which created the possibility for disasters, were primarily natural hazards such as earthquake and floods. But through time, technological risks were added to the natural ones. For example, the development of synthetic chemicals in the 19th Century and nuclear power in the 20th Century, created the possibility of toxic chemical disasters and radiation fallout crises. This paper suggests we are at another historical juncture with the appearance of a new category of disasters, what we call trans-system social ruptures (TSSR). The label tries to indicate that these kinds of disasters jump to or cut across different social systems. Using examples such as the spread of the Severe Acute Respiratory (SARS) and the SoBig computer F virus, both in 2003, we describe in ideal type terms the primary characteristics of TSSR. We also discuss examples of future TSSR especially those rooted in biotechnological advances and the spread of globalization that create new social networks. The paper concludes with an effort to place TSSR within the full range of disasters, including old and traditional manifestations as well as ones with mixed old and new characteristics/

Introduction

As a very old cliché states, the only constant is change. This certainly does apply to human societies. As such, it applies also to the disasters that impact such systems

There would appear to have been three major transformations in the nature of such phenomena. Clearly disasters, as disruptions of social life, are as old as when human beings started to live in semi-permanent groupings. Initially, the hazards that created the possibility for disasters were almost exclusively natural ones, such as earthquakes, floods and tsunami. But in time, risks from technological agents were added to the natural ones. For example, the development of synthetic chemicals in the 19th Century and nuclear power in the last century, created the possibility of toxic chemical disasters and radiation fallout crises.

In this paper we indicate that we seem to be at the initiation of another historical juncture with the emergence of another new kind of disaster. This third kind we call "trans-system social ruptures" (TSSR); with the initial use of the term "ruptures" being advanced by Patrick Lagadec (2000). The longer label tries to indicate these kinds of disasters jump to or cut across different social systems in ways not noticeable in the older natural and technological based disasters.

In the rest of this paper we address four different although related issues. First, we describe the major social characteristics of TSSR. The specific examples used are the spread of the Severe Acute Respiratory Syndrome (commonly known as SARS), and the spread of the SoBig computer F virus, although a number of other similar cases were also used in our initial analysis. SARS involves a "natural" phenomenon, whereas the computer virus was intentionally created.

Second, using mostly current and impending biotechnological innovations we give examples of where future TSSR might occur. While such specific forecasts of the future are almost never done by social science researchers, they are a scientifically legitimate undertaking. To some extent, in the long run the projections we make will be a general test of whether or not our theoretical views have any validity.

Third, we then discuss those newly emerging disasters that have the characteristics along some lines of old kinds of disasters along with some features of the newer types. The examples used are the 2002 Northeast North American blackout and recent extreme heat waves and blizzards. Our paper focuses almost exclusively on the characteristics of disasters. We do not deal, except in passing with the social conditions that set the stage for the emergence of newer kinds of disaster characteristics. Suffice it to say here that the globalization process, in almost every sense of the term, is clearly a prime factor or mover of what is currently emerging.

Finally, since TSSR are additions to and not replacements of older type of disasters, we conclude with a discussion that in this century the human race will concurrently see these newer types of disasters along with continuing manifestations of older ones, as well as a

mixed form that along some dimensions have characteristics of older types mixed in with newer elements. In addition, while newer aspects will definitely be part of the future, from a numerical point of view the older or traditional disasters will continue to be a majority of all disasters for a long time to go.

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Background

To talk of newer kinds of disasters implies that there are old ones. But while disasters are as old as human groupings, more important for this paper is that in the last 50+ years, social scientists have studied hundreds of such happenings. In other words, we can not only assert that disasters have long existed, but far more important we can say that we have substantial knowledge about the human and group components involved in their emergence and manifestations. That allows a comparative analysis.

The literature at this point is massive. For example, see such recent summary reviews or general discussions such as Alexander (2000), Cutter (1994), Dynes and Tierney (1994), Dynes, DeMarchi and Pelanda (1987), McGuire (2000), Mileti (1999), Oliver-Smith (1999), Perrow (1999), Perry and Quarantelli (2005), Perry, Lindell and Prater (2005), Quarantelli (1998), Rodriguez, Quarantelli and Dynes (2006), Rosenthal, Boin and Comfort (2001), and Tierney, Lindell and Perry (2001). Our comparison of new and old is drawn from these reviews and summaries.

The Nature of TSSR

We now turn to discussing TSSR. This term is an extension of an earlier label of "social ruptures" advanced by Lagadec (2000). The longer phrase is used to emphasize the fact these kinds of disasters jump across different social boundaries disrupting the social fabrics of different social systems.

There is a considerable body of literature on both SARS and the SoBig computer F virus. Most but not all of it is journalistic in nature; in addition some of it involves technical aspects of both phenomena, Therefore, given this availability of much descriptive material , easily accessed via Google (as of January 2006 there were more than a million and a half sources listed on the spread of SARS, and a quarter of a million on the spread of the SoBig computer virus), we here will provide only very brief summary about these phenomena.

SARS. In the winter of 2003 a new infectious disease appeared in southern rural China, near the city of Guangzhou. In a process still not fully understood to this day, SARS seems to have jumped from animals to humans. Initially it spread to Hong Kong and Southeast Asia. More important, it spread rapidly but selectively around the world because international plane flights were shorter than its incubation period.

It particularly hit Canada with outbreaks in the west of the country in Vancouver and far away in the east especially in the Toronto area. A later Canadian government report later noted the following (Commission Report 2004). In a very short time, 44 persons died of the several hundred that got ill, Thousands of others were quarantined. The Toronto health care system closed down except for the most urgent of cases and countless medical and health procedures were delayed or cancelled. One result, fed by many mass media reports, was widespread anxiety, which led to the closing of schools in the area. The cancellation of many meetings led to a reduce number of visitors and tourists that had a considerable negative effect on the economy. The report noted that there was a lack of coordination among the multitude of private and public sector organizations that tried to deal with the crisis, that there was a lack of information as to what was really happening, and substantial jurisdictional on who should be doing what. SARS vanished worldwide after June 2003 although to this day it is still not clear why it became so virulent in the initial outbreak and why it has disappeared (Yardley, 2005).

SoBig computer F virus. In August 2003 this intentionally induced virus started to spread. It was hardly the fist deliberate insertion of a virus into computer systems. The first occurred in 1981 (see www.cknow.com/vtiter/vihistory.htm for a comprehensive account of earlier computer virus episodes). This virus carried it own SMPT mail program and used Windows network shares to spread (Schwartz, 2003). In fact, this virus was initially only one of a series of others that were concurrently circulating, but it soon became the dominant one around. It affected many computer systems and threatened almost all computers in existence. Its negative consequences were very costly in terms of the use of time, effort and resources that were mobilized to cope with the virus. Many organizations around the world in both the public and private sector attempt to deal with the problem. Initially uncoordinated, there eventually informally emerged a degree of informational networking on how to cope with what was happening (Koemer, 2003).

We have derived half a dozen generalizations from these two specific cases as well as about a dozen others we examined. The characteristics we depict are set forth in ideal type terms. That is, from a social science perspective, this is what would be seen if the phenomena existed in pure or perfect form.

1. The phenomena jump across many international and national/political/governmental boundaries. For example, there was the huge spatial leap of SARS from a rural area in China to metropolitan Toronto in Canada. In some instances, the phenomena may potentially spread to every possible target around the world as in the case of the SoBig virus. The spread will cross many functional boundaries, jumping from one sector to another, and crossing from the private into the public sector and sometimes back.

2. The phenomena spread very rapidly. Appearances of SARS went around the world in less than 24 hours, with an infected person who had been in China flying to Canada quickly infecting persons in that country. The spread of the SoBig virus has been called the fastest ever at that time (Spread, 2003; Thompson, 2004). This quick spread is accompanied by a very quick if not almost similar global awareness of the risk because

of simultaneous massive mass media attention. However, despite this speed, the duration of the happening at the start has no clear-cut end.

3.There is initially no known or clear point of origin, along with the fact that the possible negative effects are far from clear. This stood out when SARS first appeared in Canada, where there was much ambiguity as to what was happening and where the threat had originated. The SoBig virus was likewise marked by considerable ambiguity as to origin and what it was doing (and it was at first buried within a number of other circulating viruses. Of course ambiguity is a distinctive characteristic of disasters generally (Tierney, 2005) but it appears to be even more drastic in these newer disasters.

4..There is potentially if not actually a huge number of victims, directly or indirectly. The SoBig virus infected 30% of email users in China, that is about 20 million people (Survey, 2003). About three fourths of email messages around the world at one point were infected by this virus (Koemer, 2003). In contrast to the geographic limits of almost older types of disasters, the potential number of victims is often open ended in the newer ones, in principle the total population of the world. The actuality as in the case of SARS was really limited (only 774 deaths), but the potential was much larger as well as the belief that it could have been open ended.

5. Traditional local community "solutions" are not obvious or seem very inadequate. This is rather contrary to the current emphasis in emergency management philosophy. The prime and first focus of planning cannot be the local community as it is presently understood, although community level responses may be eventually necessary. As seen in both SARS and the SoBig virus, international and transnational organizations are typically involved very early in the initial response. The nation state may not be a prime actor in the situation.

6.Although responding organizations and groups are major players, there is an exceptional amount of emergent behavior and the development of many temporary and informal linkages. This could be seen in both the SARS and the SoBig virus spread, where there was much contact with previously unknown social actors. In some respects, the social networks that emerged, mostly in an informal way, involve much information networking, and are not always easily identifiable from the outside, even though they are often the crucial actors at the height of the crisis.

Possible Future TSSR

Social scientists studying disasters ought to be able to predict at least in general terms the future. So in this part of the paper we project several possible future scenarios that involve TSSR. Some of what we write might seem to be science fiction in nature, but the possibilities we discuss are well within the realm of realistic scientific possibilities.

A prime candidate for the future is either the inadvertent or deliberate creation of biotechnological disasters. Genetic engineering whether of humans or other living organisms is currently in its infancy. The possible positive outcomes and products from

such technological innovations are tremendous (Morton, 2005) and are quickly diffusing around the world (Pollack, 2004). But there is a double-edged feature to such innovations. They can bring much good. But they can also produce many undesirable consequences.

For example, there is the current dispute over genetically modified crops. Many societies in Europe have resisted and set legal limitations to their use and spread. This has occurred not because any disasters have so far resulted from their existence, but because there have been so many accidents and incidents that indicate that it is only a matter of time when some major crisis will occur.

As illustrations of the limited occurrences so far we can note that in 2002, StarLink corn approved only for animal feed was found in the food supply such as taco shells and other grocery items. In the same year, European farmers learned that they had unknowingly grown modified canola using mixed seeds from Canada. The following year, modified corn was found in Mexico even though it is illegal for planting in the country, In the same year, in Nebraska experimental corn engineered to produce a pharmaceutical was found in soybeans. In several other places organic farmers found it was impossible to their fields uncontaminated (see Pollack, 2004, for further details about all these incidents and other examples).

Very noticeable in all these examples is the leaping of boundaries and ambiguity about the route of spreading. With only a little imagination it is possible to visualize a modified gene intended for restricted use, escaping and creating a contamination that could wreak ecological and other havoc.

To some observers, even more disturbing is genetic engineering of human beings. The worldwide dispute over cloning, while a philosophical and moral issue, also partly involves concern over creating flawed human beings. It is not far fetched to visualize worst-case scenarios that would be truly disastrous.

We should note that even when there is some prior knowledge of a very potential serious threat, what could happen might still be as ambiguous and as complex as when SARS first surfaced. This is illustrated in the continuing and widespread concern starting in 2004 to the present time about the possible pandemic spread of avian influenza, the so called “bird flu” (Nuzzo, 2004; Thorson and Ekdahl, 2005). This illness has already appeared sporadically in at least a dozen Asian countries and here and there in Europe. Worst-case scenarios project that if the flu would spread globally, possibly 30% of the world population would die. But the possible flu spread, its effects and whether presently available protective measures would work are so unknown that the knowledge that it might occur, provides very little understanding on what might actually happen.

To keep these scenarios in perspective, it is necessary to note that a future TSSR could also result from a “natural “agent. For example, there is the possibility that asteroids or comets might again hit the planet Earth (Di Justo, 2005). This happened in the past but the future negative consequences would result mostly from changes in human societies

and lifestyles. For instance, a landing in the ocean could trigger a tsunami like impact in built up coastal areas. Thinking of how, when and where evacuations of population might have to be undertaken, is a daunting thought. A major terrestrial impact anywhere on land could generate very high and dense quantities of dust in the atmosphere. This would affect food production as well as creating massive economic disruption (a small hint of the latter was indicated by the fallout from the Mt. St. Helens volcanic eruption). Planning for and managing the problems that would result from something of such a global nature would be enormous. Many of the characteristics of TSSR could appear in an impact of a comet or a large asteroid. There would be massive crossing of boundaries, very large number of potential victims, no local community "solutions" for the problems, etc.

Socially Amplified Disasters

There are disasters that only partly share the characteristics of TSSR. Many disasters have old or traditional characteristics, but nonetheless are new in some important aspects. These represent cases of what we call socially amplified crises and disasters (SACD)---although in this paper we discuss crises only in passing. Crises essentially involve conflict types of situations (which have been increasingly called willful disasters) such as the 9/11 attack, the Madrid and London train bombings, the Oklahoma City bombing, and many recent terrorist attacks around the world.

Other researchers initially developed the idea about a social augmentation process with respect to risk (especially see Pidgeon, Kasperson and Slovic, 2003). To these scholars, risk not only depends on the character of the dangerous agent itself but how it is perceived in the larger context in which it appears. The idea here is that aspects relevant to hazards interact with processes of a psychological, social, institutional, and cultural nature in which they can increase or decrease perceptions of risk (Kasperson and Kasperson, 2005). It is important to note that the perceived risk can be raised or diminished depending on the factors in the larger social context. This makes it different from the vulnerability paradigm which tends to assume the factors involved will be primarily negative ones.

We have taken this seminal idea and extended it to the behaviors that appear in disasters. So in addition to the development of new hazardous or risky agents as can be seen in TSSR, there also existing social settings that crucially affect if and how some disasters will occur and be perceived. The latter is what is at the core of SACD.

For example, extreme heat waves and massive blizzards are hardly new weather phenomena. As climatological hazards, they have been around as long humans have been around. In that respect, they have very old antecedents (for statistical data see Burt, 2004).

Two recent heat waves however had new elements in them. A long lasting and very intensive heat wave engulfed France in 2003. Eventually about 15,000 persons died (and perhaps another 22,000 to 35,000 in all of Europe). One aspect especially stood out,

This was that victims were overwhelmingly socially isolated older persons. Another feature was that officials very slow in accepting the fact that there was a problem almost did not react at all (Lagadec, 2004). A somewhat similar happening in 1995 in Chicago was not much noticed until reported in a study seven years later (see Klinenberg, 2002). Again the occasion was marked by older and isolated victims, official bureaucratic indifference and mass media lack of attention.

At the other temperature extreme, eastern Canada in 1996 experienced an accumulation of snow and ice that was far beyond the typical. The ice storm heavily impacted electric and transportation systems, especially around Montreal. The critical infrastructures affected led to chain reactions that created problems in banks and refineries. At least 66 municipalities declared a state of emergency. Such a very large geographic area was affected that many police were baffled that "there was no scene" that could be the focus of attention (Scanlon, 1998). In the response many emergent groups and informal network linkages surfaced (Scanlon, 1999).

What appeared was similar to what happened in August 2003 when the highly interconnected eastern North American power grid started to fail when falling trees short circuited three transmission lines in Ohio (Townsend and Moss, 2005). This created a cascade of power failures in cities from New York to Toronto and eventually left 50 million residents without power. In turn this disrupted everyday community and social routines (Ballman,2003). Telecommunication and electrical infrastructures were entwined in very complex, interconnected and network systems that were spread over a very large geographic area with multiple end users. Establishing the exact path of failure propagation through a huge, complex network took months of investigation.

Such power blackouts have become very common happening recently for example in New Zealand, Argentina, Sweden, and Russia. These and other similar cases initially involved accidents or software/hardware failures in complex technical systems. These in turn generated chain reactions with profound negative consequences. Actually while these happenings are recent, nearly two decades ago a National Research Council report (1989) forecasted the almost certain probability of these kinds of risks in future network linkages.

The cited examples in this part of the paper are not quite TSSR, but neither are they like the older or more traditional instances. It is the social setting in which they occur that determines their characteristics. Many social settings are more complex and differentiated than ever before. So SACS are more frequent than ever before. In fact, a case can be made that these in-between types are probably more common than TSSR.

The Full Range of All Disasters

Our focus on TSSR and discussion also of SACS raises several questions about the older types of disasters. Will they continue to exist? If so, what might be the relative proportion of all kinds of disasters? Our answer is that not only will traditional disasters continue to exist in the near future, but also that at least in number they will still be the

most numerous of disasters. In short, while there are and will be old, new and in between types of disasters in this century, most disasters are and will be the traditional ones.

These general points have been detailed and documented elsewhere (see Quarantelli, Lagadec and Boin, 2006). Here we will only note three kinds of traditional disasters

First, there are minor or garden kinds of disaster that occur everywhere. This is saying that there is nothing significantly new in such occasions as: localized floods and tornadoes, hostage takings or mass shootings, exploding tanker truck or overturned trains, most landslides or forest fires, disturbances if not riots at local sport venues, large plant or coal mine fires, most actual or possible plane crashes, stampedes and panic flights in buildings, limited dam ruptures, ferry sinkings etc. These more circumscribed and localized disasters have traditional characteristics such as the need and the possibility of being community handled. The recent Sago, West Virginia coalmine disaster as well as those that have recently happened in China plus ferry accidents that have been in the news recently, are good examples of what the world inevitably faces in at least the near future.

Then there are major disasters. For example, in 2004 there were 78 federally declared disasters in the United States. A general examination of these happenings as well as a detailed look at some specific instances showed that most were not in a social sense that different from traditional kinds of disasters. As an illustration, four hurricanes hit Florida that year. There was little in what we observed that required thinking of them as having distinctively new features (compared to what DRC had studies in dozen of previous hurricanes). The human and organizational problems that surfaced were the usual ones. More important, emergent difficulties were actually somewhat better handled than in the past. The warnings issued and the evacuations that were undertaken were better than in the past. Looting concerns were almost non-existent and less than 10 percent of the population surveyed indicated possible mental health effects. The organizational mobilization and placement of resources beyond the community level was also good. While the efficiency and effectiveness of local emergency management offices was markedly higher than in many past occasions, not everything was done well. Known problematical aspects and failures to implement measures that research had suggested a long time ago appeared. There were major difficulties in interorganizational coordination and the recovery period was plagued by the usual problems. Even the failures that showed up in preimpact mitigation efforts were known.

From our viewpoint, the great majority of contemporary major disasters in the United States are rather similar to most of the earlier ones. For instance, what DRC had observed in hurricanes in the 1960s and 1970s was rather similar to what we saw in the 2004 Florida ones. On the other hand, Hurricane Katrina in 2005 was markedly different (see Quarantelli 2005, Rodriguez, Trainor and Quarantelli 2005) and was much closer to being a TSSR.

However, megadisasters are and will continue to be rare in a numerical and relative sense. For example, recent terrorist attacks on the Madrid and London train systems were certainly major crises, symbolically very important and the focus of extreme mass media attention. But numerically there are far more local train wrecks and collisions everyday in the world. The more localized disasters and even traditional major disasters will continue to be the most numerous, despite ever increasing TSSR and SACD. So while the world is and will continue to be faced with a mixture of old, new and in-between types of disasters, there are not anywhere equal numbers of each type.

Some recent occurrences such as the just mentioned Hurricane Katrina, the 2005 tsunami in southwest Asia, and the Pakistan earthquake in 2006, have raised questions among some scholars on whether such happenings constitute still another new kind of disaster type. While some such happenings at times have the characteristics of SACS, most are simply catastrophic disasters or megadisasters. (for the features of such happenings see Quarantelli, 2005). Equally as important, catastrophes have happened as far back as human history has existed. So megadisasters are not new phenomena.

There are major consequences that will result from the heterogeneity of the disasters the world will increasingly face. This social differentiation will present very complicated and daunting challenges in the planning for and managing of this range of negative social occasions. However, any analysis of consequences cannot proceed unless there is some prior knowledge on what are the primary identifying characteristics of such occasions, which is what has been the focus of this paper.

End Notes: A number of the ideas expressed in this paper are drawn from a much larger and far more detailed and referenced document that will appear as a chapter in the Handbook of Disaster Research scheduled to appear in late 2006 and edited by Havidan Rodriguez, E. L. Quarantelli and Russell Dynes. The co-authors of that chapter in the Handbook are E. L. Quarantelli, Patrick Lagadec and Arjen Boin, and the title is: “A heuristic approach to future disasters and crises: New, old and in between types”. However, all the statements expressed in this paper are the views of the author and do not necessarily represent the opinions of all the coauthors of the larger document.

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