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THE CHARACTERISTICS OF CATASTROPHES  
AND THEIR SOCIAL EVOLUTION:  
AN EXPLORATORY ANALYSIS OF  
IMPLICATIONS FOR CRISIS POLICIES AND  
EMERGENCY MANAGEMENT PROCEDURES

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\* Some of the ideas discussed extensively in this paper were first introduced in three earlier articles (see Quarantelli, 2005; Rodriguez, Trainor and Quarantelli, 2006; Quarantelli, 2008).

## Introduction

Disaster and crisis researchers and theorists have struggled for more than half a century trying to define and conceptualize their central object of study. The very first team of social science “disaster” researchers was put together in 1950 at the National Opinion Research Center (NORC) at the University of Chicago. One of its first collective products was a definition of “disaster”. It came to be known as the Fritz definition, named after the original writer of the concept. It advanced the notion that a disaster was an event concentrated in time and space, in which a society or one its subdivisions undergo physical harm and social disruption, such that all or some essential functions are impaired (Fritz, 1961 although his earliest written versions go as far back as Fritz, Gordon, Krauss and Quarantelli, 1950; Fritz, 1952). The definition was widely used in the literature (and still is to some extent even today), but by the 1970s it started to be modified as well as replaced by other formulations (see Quarantelli, 1982 for seven different major conceptions that had emerged by the early 1980s; see also Perry, 2007 for a very good and up-to-date discussion of changes in the current conceptualization of the term “disaster”).

One of the earliest and ever present criticism was that while there always has been an implicit recognition that the term was used to cover a wide range of phenomena, there nevertheless had been a strong tendency to label everything within that range, “disasters” (see examples by different theorists in Quarantelli, 1998; Cutter, 2002; Perry and Quarantelli, 2005). However, in recent years, there has been an increasing explicit call to separate out everyday disasters from mega disasters or catastrophes. Any even rather surface observation will, for example, conclude that a tornado which only impacts a single neighborhood in a metropolitan area is simply a qualitatively different social phenomenon than a tsunami such as the one in 2004 in the Indian Ocean that impacted hundreds of communities in at least a dozen nation states that were thousands of miles apart.

The need to develop a meaningful distinction has not only been pushed by theorists interested in researching disasters, but also by operational personnel, emergency planners and management trainers in educational institutions (e.g., in March 2008 the FEMA National Training Center at Emmitsburg developed a course for its own use on Catastrophe Readiness and Response where the first session was entitled “Definitions, Background and Differences Between Disasters and Catastrophes”, see Blanchard, 2008). The Public Entity Risk Institute published in 2008 the proceedings of an earlier conference where experts from industry wrote papers on what had been learned for practice and teaching from the Hurricane Katrina mega disaster (see PERI, 2008).

In addition, from a policy viewpoint, that hurricane became the subject of numerous US Congressional hearings which struggled to try and see in what way that occasion was different from prior collective crises that had affected American society. For example, the US House Homeland Security Committee concluded that the Department of Homeland Security had strengthened the wrong policy of federalizing the response to a possible “major U.S. catastrophe” (McNeil, 2008:1). Outside of the United States, reconsideration

of what might be new was also triggered by the 2004 Indian Ocean tsunami which led many bureaucratic and governmental leaders elsewhere in the world to ask whether different crisis management policies needed to be considered (it did lead to the initiation of a multi-nation Indian Ocean tsunami warning system similar to what has existed for decades in the Pacific, modifications in the national warning system in Japan for tsunami, and changes in planning in some European countries how mass casualties in collective crises would be handled in the future).

Our intention is to contribute to this ongoing dialogue. In the words of the title and subtitle to this paper, we intend to say first of all something relevant about the characteristics of catastrophes, including why we single them out for attention. After that we address the implications these characteristics have for crisis policies and emergency management. The paper concludes with a discussion of the social evolution of the phenomena of catastrophes from the past to the present and likely changes in the future. Hopefully, our contribution will not only be in what substantively we say, but also in how we went about developing our observations, not all of which were reached by standard orthodox procedures.

### Goals of the paper

As just indicated, our paper is threefold in intent. First, we want to describe and illustrate from research data the more relevant characteristics of catastrophes, their basic generic features. Second, we want to hypothesize what implications these characteristics might have for crisis policies and emergency management procedures, what difference it makes especially in contrast to disaster occasions. And third, we want to explore if current catastrophes are different from those that happened in the past, as well as those likely to occur in the future.

1. Our first goal is to try to clarify conceptually what might be involved in a catastrophe. This necessitates taking a position on how concepts can be used in research. We do this by noting the distinction that was made more than a half century ago by Herbert Blumer, a sociologist who distinguished between definitive concepts and sensitizing ones. He wrote:

A definitive refers precisely to what is common to a class of objects, by the aid of a clear definition in terms of attributes...A sensitizing concept lacks such specification of attributes...and consequently it does not enable the user to move directly to the instance and its relevant content. Instead, it gives the user a general sense of reference and guidance in approaching empirical instances. Whereas definitive concepts provide prescriptions of what to see, sensitizing concepts merely suggest directions along which to look (1954:7).

More current proponents of using sensitizing concepts argue that they can be used to draw attention to important social features that otherwise may be missed and that they provide guidelines for research and analysis (Charmaz. 2003; Padgett, 2004; Bowen, 2006). We generally agree that using sensitizing concepts in an inductive manner is a

very good first step. However, contrary to the more dogmatic proponents of grounded theory, we think and as we do later in the paper that other perspectives can concurrently be used in any study. For example, there are numerous research drawn observations and propositions in the literature about social behavior in general and also specifically in disasters (far less so for behavior in catastrophes). We use such research in a deductive manner to compare and to show how behavior in catastrophes is similar as well as different from what has been found in disasters.

That said, initially in this paper, using catastrophe as a sensitizing concept led us in four directions. Let us note in just one sentence for each direction, what we will discuss in detail later. What are the implications that catastrophes only involve natural hazards and technological risks rather than other threats? In what way is it significant that in these occasions the time between initial impact and consequences was relatively short? A very large area with multiple land uses and diverse communities is subjected to major threats to life and property in catastrophes; so what? And in what way does it matter what are the initial human and group reactions of those threatened or impacted?

2. Additionally, this paper examines the social consequences of catastrophes. However, we limit our remarks to short run consequences, those that emerge at impact time and in the immediate aftermath. The longer run consequences of course are very important but also rather different than the shorter term ones (this is discussed elsewhere by one of the authors of this paper, see Barnshaw, forthcoming; see also Rodriguez, 2006).

There is a rather substantial literature on how human beings and social groups react and respond to disasters (thought of as being different in some ways from catastrophes). There are a number of recent summaries and reviews of this literature (see, e.g., Tierney, Lindell and Perry, 2001; National Research Council, 2006; Rodriguez, Quarantelli and Dynes, 2007).

We used this existing knowledge and understanding of what has been established goes on in disasters by contrasting it with what we think we can see in catastrophes. For this purpose, we selectively drew mostly, but not exclusively, from the social features of the Chernobyl nuclear plant radiation fallout, the 2004 Indian Ocean tsunami, the Northeast blackout in 2003, and Hurricane Katrina. These four occasions were used for several reasons. Even the initial press reports of their occurrences left a strong impression that they were considerably beyond typical disasters. There is also a substantial literature, popular and scientific, easily accessible for all four occurrences. Finally there are some diversities, not only in terms of the hazards and risks involved (e.g. radiation fallout, tsunami, hurricane and flood, critical infra structure accident) but also what parts of the world were affected including rather different political and social systems as well as cultural and lifestyle frameworks.

The kind of social occasion we project, a catastrophe, results in most everyday community functions and social institutions being sharply and concurrently interrupted (in contrast to this not happening in a disaster). If that is true, what are the emergency management and policy and policy implications of such a social occurrence? In other

words, if catastrophes are what we have said they are, in what ways policies and procedures might have to be changed from those that are likely to be planned for and implemented in disasters? Certainly if the characteristics of catastrophes are different in some significant way from those of disasters, this is a question that has to be asked.

3. Our third goal is a more modest one than the other two and therefore is addressed more briefly at the end of the paper. In question form, we ask if there has been in the past a social evolution in catastrophes, as well as the possibility of evolutionary changes in future ones. Our focus in the paper is on current or contemporary catastrophes. But when did they become a part of the human scene and why? Are they likely to evolve even more in the future, in what directions, and why?

In addition, the paper as a result of the analyses undertaken of the points indicated above also ended up addressing other issues and questions. For example, in discussing characteristics we extensively examine the extent to which it might be possible to develop a numerical index to identify a catastrophe.

For many of the questions we raised and issues we discussed, we felt we had enough data of good quality, to reach very defensible conclusions. However, for a few questions and issues we fell short, in some cases being unable to set forth a clear-cut position on the ideas we explored. Sometimes this was because of a lack of relevant data; at other times because the available data could be interpreted in contradictory or inconsistent ways. In other cases, the best we could do was to suggest possible hypotheses that other researchers in the future might study. So while we think we have done a reasonably adequate job in terms of the title and subtitle of the paper, we recognize that more needs to be done before any claim can be made that the topic has been fully addressed across-the-board and conclusively. There is a start here, but at best only an exploratory start.

### The Characteristics of Catastrophes

Except in passing and mostly by implication, this paper does not explicitly address the antecedent conditions or larger social contexts which contribute to the development of disasters and catastrophes. There is an extensive literature on that topic (see, for example, different chapters in Rodriguez, Quarantelli and Dynes, 2007). In addition, with respect to catastrophes, it is not easy to talk about the factors that lead to something without first characterizing at least the generic dimensions of that something. Conditions cannot be well addressed unless there have been some initial specifications of the phenomena being studied.

Therefore, we now turn to elaborating what we have actually found about the characteristics of catastrophes. While we separately discuss four different dimensions, all four have to be present to truly have a catastrophe. The question of how and what to do analytically if all four are not in the occasion we leave for consideration by theorists in the future who might use this paper as a starting point for analysis.

1. What is the nature of the initial threat or risk in catastrophes? Where can we get some clues as to what agents or sources might be most directly involved? Maybe the best starting point is to ask what in the past has been singled out by scholars as precipitating happenings or immediate events in the generation of crises? An obvious answer to these questions is to look for typologies advanced to classify crises. It is important to note that the only factor being sought here is the agent involved. That is rather different from asking what conditions are responsible for catastrophes. That is not being sought here. At most we will be able to suggest one but only one characteristic of catastrophes.

Typologies of disasters and related social phenomena are not new. More than 75 years ago, Carr (1932) set forth a typology, apparently the first scholar specifically interested in disasters to do so (but not the first sociologist, for that see a passing reference in Queen and Mann, 1925: 431; for a very recent formulation see Trainor, 2008). Carr distinguishes between an 1) instantaneous-diffused type such as the explosion of a munitions ship in Halifax harbor; 2) an instantaneous-focalized one such as a village school house explosion which left the rest of the community physically intact; 3) a progressive-diffused one such as the 1906 Galveston hurricane and 1927 Mississippi River flood; and, 4) a progressive-focalized one such as a mine fire or shipwreck such as the loss of the Titanic. It is noticeable that Carr refers only to natural hazards or technological risks in all of the disasters he discusses.

However, in a well known book Barton (1969) nearly four decades later set forth an extensive typology (still the most elaborate one ever set forth to the present day) of what he calls collective stress situations. Today these would be called collective crises (see Boin and 't Hart, 2007). Barton presents an elaborate rationale for differentiating the types, using four dimensions of such situations—namely scope of impact, speed of onset, duration of impact, and social preparedness (1969: 41). This resulted in 36 types of collective crises. Unfortunately Barton was not consistent in using “social preparedness” as a dimension so six of the types do not really appear to be the same kind of social phenomena as are involved in his other types. It is no accident that none are even remotely suggested today as collective crises (e.g. the status of a chronic minority party, rural slums, etc.), although some could reasonably be visualized as long lasting social problems (e.g. the poverty of lowest income groups, ghettos). Of the remaining 30, half involve natural hazards or technological risks. Of the other 15, six are conflict situations with the rest of them either an organizational or economic problem (e.g. planned retirement of an organizational leader, a small firm producing an obsolete product) which most researchers would have difficulty seeing as involved in collective crises of the same kind as seen in disasters or catastrophes.

However, the conflict situations need to be discussed further since there has been no consensus among scholars as to where such occasions ought to be classified. A minority of “disaster” researchers sometime considers them as simply another kind of disaster. They do not see it as problematical or an issue. Another point of view distinguishes between consensus and conflict occasions. While granting some overlap in characteristics, the argument is that there are two different kinds of phenomena involved. A third position is to argue that the issue can only be settled by empirical data, but that

has not happened so far. This view seems to be that resolution of the issue is possible. Finally, a fourth position, and it may be the majority view among all researchers, is that there is a problem or question here which has been unresolved and there is little possibility of reaching consensus soon. Most taking this last position operate somewhat pragmatically going ahead and doing whatever research interests them. For example, most of the self-identified American disaster researchers in the 1960s and 1970s did not hesitate to study the urban riots and university civil disturbances that occurred in those decades. Similarly, but more recently, the terrorist attacks on 9/11 became the immediate focus of research attention of “disaster” scholars with little thought being given to where the event might be classified in a typology of collective crises. The Disaster Research Center (DRC) has mostly followed this somewhat ambiguous path in its research efforts.

Pragmatic research considerations aside, some position has to be taken in a paper such as ours which says it is going to identify the characteristics of catastrophes. That very phrasing implies that there is something distinctive about catastrophes. Given that, we have deliberately excluded from this paper any extended consideration of what used to be called conflict situations but more recently labeled by the National Academy of Sciences as “willful disasters” (National Research Council, 2006). Prime examples of such occurrences would be terrorist attacks, war time air raids on civilians, mass shootings in schools, episodes of ethnic cleansing, “trolling” of online computer communities, assassinations of political leaders, and riot situations. Our reasoning is as follows. A basic difference between disasters/catastrophes and such willful occasions is that in the latter kinds of crises, one or more of the major collective social actors involved in the conflict are explicitly trying to injure and kill or at least severely damage other social actors in the situation, as well as often destroying property. This kind of overall deliberate attack is absent in disasters/catastrophes. (As can be seen by comparing the terrorist attack in Mumbai, India with Hurricane Katrina in the United States) .From our perspective, because of this and other social factors, such crises only partly overlap with what is found in disasters and catastrophes that involve natural and technological agents. As such, “willful” crises deserve their own extensive independent description and analysis (as an example of a comparative contrast between behaviors and consequences in riots and in disasters, see Quarantelli, 1993).

Our conscious decision therefore was to confine ourselves to occasions involving only significant natural hazards and technological risks (only these were mentioned by Carr and those most mentioned by far by Barton). We recognize of course that the term “natural” is a misnomer given that even natural phenomenon is socially constructed. See Cannon who recently wrote:

There is now ...greater acceptance of the idea that disasters occur only when a vulnerable population “gets in the way” of a hazard...Disasters may be triggered by natural hazards, ... but can be considered largely a product of processes involving economic, political and social factors (which... can be called simply social factors). (2008:350-351).



It is in that sense of social construction that we see catastrophes as involving natural hazards and risky technologies. Disasters and catastrophes can not be distinguished on the basis of the hazards and/or risks that are present. Rather catastrophes have in Cannon's term, different operative social factors. Or in other words, the social settings in which natural hazards and risky technologies appear can be rather different. It is such differences that are responsible for whether the occasion becomes a non-crisis event, a minor emergency, a disaster or a catastrophe. The radiation fallout, the tsunami, the critical infrastructure accident and the hurricane/flood we have in our four major cases, were a feature of the ensuing catastrophe, the precipitating agents involved so to speak, but just by themselves could not have created the catastrophes.

Thus, in this section, starting with Carr's typology, we first reduce our focus to taking the position that catastrophes involve natural hazards and risky technologies. However, these dangers will only manifest themselves depending on the larger social setting in which they appear. Thus, while the presence of hazards and risks is a characteristic of all catastrophes, they are not the only dimensions necessarily involved in a catastrophe.

But can we narrow down our formulation even more? The natural hazards and risky technologies have to be significant in their effects. As a simple example, everyday there are hundreds of thousands of earthquake shocks, but so minor that almost all do not catch the attention of human beings unless one is a seismologist using very sensitive machines to measure even the slightest of tremors. The very example just given suggests that maybe significant earthquakes can be identified in numerical terms.

In actual fact, there is a huge literature on the risks and hazards that human beings and their societies are vulnerable to in some way or other. Many of the efforts to identify dangers try to provide numerical indicators of the threats. While the research on natural hazards and technological risks is only a relatively small part of that body of literature, it is substantial.

It should be noted that while almost all hazards and risks are very numerically categorized, the quantification efforts range from being very specific to being very vague. For example, hurricanes are these days classified into one of five categories, category 5 being the highest. There are two separate scales for classifying earthquakes (the Mercalli 11 point scale and the Richter 9 point scale). And tornadoes are usually measured by the 6 point Fujita scale that uses an estimate of resulting damage to structures and vegetation. And while there are discussions with numbers attached to floods (e.g. a 500 year flood, or a flood stage for a particular location on a river) they are nowhere near the surface precisions of what is used for example with earthquakes. While the majority of risky technologies are even less talked about in numerical terms, it is possible to measure radiation fallouts or the distance over which a dangerous chemical might be toxic. Overall, our point here is that many numerical estimates have been developed in efforts to quantify most natural hazards and technological risks. As far as we can, see only volcanic eruptions and tsunami have not been quantified in some way.

However, while a case can be made that it might be very useful if researchers could numerically identify significant natural hazards and technological risks in catastrophes, there are major problems with trying to do so. This does not mean such an effort should not be attempted. However, the current limitations of such an effort ought to be acknowledged. Thus what follows should be read as suggesting that ideally the idea might be great in principle, but difficult if not impossible to fully implement in practice, not only now but in any likely future in this century.

What is hazardous for one social setting is not necessarily the same for another. Although some of the attempts to quantify try to take into account the setting where impact occurs, most essentially fall back on some subjective judgment or perception (and there can be considerable variations in individual and organizational interpretations even by experts). A Category 5 hurricane will be significantly different if it impacts a community with very high and implemented building standards, etc. as compared to a community made up of unreinforced mobile homes. In the former case, the damage and destruction will be significantly less than in the latter even though the magnitude of the physical hazard is the same in both instances. In fact, the very great majority of high category hurricanes and typhoons are born and die in the Atlantic and Pacific Oceans and are not involved in creation of disasters or catastrophes.

Stated another way, the nature of the larger social setting is far more important in determining the significance of whatever the hazards or risks involved. Thus, the numerical measurement that sometimes can be estimated will at best be ambiguous predictors of their significance for disasters and catastrophes. When all is said and done, the relationship between hazards/risks and disasters/catastrophes is complex and indirect as scholars sometime uneasily recognize (see the National Research Council, 2006 report where the academic tension is obvious between researchers from the two conceptual approaches.)

2. Almost everyone who has developed a typology has addressed the question of the duration of the event or occasion. Usually the answer has been sought along two different lines. How long does the crisis last or how long does it take for impact to occur after the agent appears? But one way or another, researchers have concerned themselves with temporal dimensions (unfortunately from our perspective so far only and solely in terms of chronological rather than social time.)

A catastrophe happens relatively quickly. It usually develops within hours; a few days at most. There is a short time period in catastrophes between the initiations of some precipitating happening (e.g. the formation of a hurricane or nuclear radiation dispersal) and a perception of serious immediate consequences for people and things. This differentiates catastrophes from other negative environmental happenings such as in famines and droughts (and some epidemics as well as risks from very hazardous waste sites) where there is a very long time period between the start of a threat and noticeable consequences.

In the four major occasions we noted earlier that we were using for analytical purposes, the time period for the initiation of a crisis was very short. In the Northeast blackout it was only 20 seconds between a last major mistake in a Michigan control room and the initiation of a cascading electric grid power failure in the US East Coast and south east Canada. While the Soviet government tried to keep secret the radiation fallout from the accident at Chernobyl, radiation monitors located in Sweden identified a serious problem within hours. In the instance of Hurricane Katrina and the Pacific tsunami, at the very time of physical impact, it was clear to victims and affected communities just from visual perceptions that there were going to be serious consequences.

Now it is true that it took extensive mass media reports to socially construct all four occasions as being as catastrophic as they were. In fact, the very term “catastrophe” (in a popular rather than technical sense as used in this paper) was very widely used. Also, the imagery of the mass media, often using dramatic pictures and informative maps, strongly conveyed the idea that the reporting was about something considerably beyond a usual or typical disaster. And that happened quickly.

Of course it could be argued, and correctly so, that it was antecedent conditions of considerable duration that ultimately were responsible for massive negative situations. For example, a great deal of post-Katrina discussion and controversy has zeroed in on the point that the great vulnerability of some of the residents of New Orleans and the existing weaknesses of the responding local governmental organizations had developed over decades (for both scholarly and polemic views see e.g., Hartman and Squires, 2006; Olasky, 2006; Troutt, 2006; Bates and Swan, 2007; Potter, 2007). They were not something that was created by the appearance of Hurricane Katrina. However, to ignore the fact that the area and its people had a very short time between becoming aware of the threat and its actual impact, is to dismiss the catastrophe that occurred as merely epiphenomena (as viewed in philosophy, a phenomenon which is considered secondary to other phenomena). In actual fact, as in all catastrophes, the perceived and real time in which people and organizations have to react is rather limited.

3. A catastrophe usually occurs over a very large and diffuse spatial area. In contrast, the Fritz definition of disasters alluded to at the start of this paper, and many others advanced since his initial conceptualization, either explicitly or implicitly takes the position that the event will occur in a spatially concentrated area. However, it is our position that the size and diffuseness of the impacted area is very important in understanding the nature of catastrophes. This is because the sheer scope of a catastrophe almost insures that impacted areas and localities will be rather socially heterogeneous in terms of land use and population diversity.

Looking at the four catastrophes we focus on, we can see the following. The electric grid power outage quickly affected negatively about a third of Canada’s population and about one seventh of the US population, probably at least 50 million people including residents of Toronto, Baltimore, Cleveland and New York City. The radiation fallout from Chernobyl fell not only in the northern parts of the Soviet Union such as Belarus, but in the center of Europe such as in Germany, and as far north as in the Arctic Circle in

Sweden and Finland. Apart from these locations and sites where the fall out created a real threat, the radiation cloud circled around the globe (although as was later found out, it did not create a real risk in that lengthy journey). The tsunami differently impacted at least a dozen nation states around the Indian Ocean in a circle extending from southeast Asia to the coast of Eastern Africa. Finally, because of mass media focus on the city of New Orleans, it is not well known that Hurricane Katrina affected a dozen states although the vast majority of damage and destruction was only in four of them, with the greatest impact by far on southern Mississippi. The federal disaster declarations covered about 90,000 square miles (Senauth, 2007: ix). By almost all criteria, these four catastrophes would rank among the largest ever in terms of areal impact of such occasions.

A close look at maps and accounts of where there was direct impact clearly leads to two major conclusions about these four catastrophes. First, a very large or extensive but not necessarily fully contiguous area was impacted. While in each case thousands of square miles were threatened overall, there were localities near, around, and in between impacted areas where there was no serious effects. Second, and more important, space with multiple land uses and rather diverse communities was involved. The broadness and size of the impacted areas all but insure that. As such, we consider this an important dimension or characteristic of catastrophes.

However, while we consider what we have just said is a valid conclusion, it is nonetheless a somewhat vague point. We have suggested that a large but noncontiguous area is affected. How “large” an area? We have said that the affected area involves multiple land uses and communities with diverse populations and other social characteristics. How many are needed and along what lines is there diversity? Since we could not answer those questions, we temporarily considered another approach.

Apart from what we have just discussed, an obvious question to ask about a catastrophe is whether its scope can be quantified in some way? There are some good candidates for numerical treatment of such occasions. People are killed as well as injured in different ways. Material things collectively thought of as property are destroyed or damaged in varying degrees.

Now if there is one thing that is true of catastrophes as well as big disasters is that there will be very many reports in the mass media as well as in press releases of responding organizations about the number of the dead and injured as well as figures on property damages. However, some authoritarian regimes in the past such as the Soviet Union and Maoist China prohibited any kind of public reporting about such data. In the Soviet Union some occurrences probably were catastrophes (see Oberg, 1986 for cases), but it was not until the Chernobyl nuclear radiation fallout crossed international boundaries that forced a reluctant official public admission about a catastrophe. To this day, little information about the 1976 Tangshan earthquake in China has become public although what is known clearly indicates it was a catastrophe; but present day China initially opened up very publicly both domestically and internationally about its 2008 Sichuan earthquake. However, such absence of public information about disasters and catastrophes has been and is today the exception rather than the typical (although the

recent and mostly successful efforts of the military junta controlling the governmental structure in Myanmar to block the spread of information about the effects of the 2008 cyclone, shows that it can be done).

Usually there is no shortage of statistics. Some is produced almost immediately after impact. Our own real time observation of cable news channels in developed societies is that casualty reports are usually the second part of the story after an announcement that a hazardous event (i.e., an earthquake, an explosion) has happened. And later news reports and organizational accounts tend to provide even more statistics.

For example, with respect to the tsunami, the following are brief snippets from a typical report, in this case from the Centers for Disease Control and Prevention (see 2006). The combined estimated death toll in India, Indonesia, the Maldives, Somalia, Sri Lanka and Thailand was 230,000. The highest number of casualties in Aceh Province was an estimated 130,000 persons. Twelve countries were impacted, most notably four (Indonesia 166,760 deaths and 811,409 displaced; Sri Lanka 30,974 deaths and 553,287 displaced; India 10,872 deaths and 647,556 displaced; and Thailand 5,305 deaths and 8,500 displaced. Now if this and many similar reports and accounts could be taken seriously, it might be possible to start moving towards creating some numerical index (using both absolute numbers and relative or percentage numbers) of what might be a catastrophe instead of a disaster.

However, there are three serious problems in trying to develop any kind of numerical index. First, the most sophisticated and very well run center for gathering “disaster” statistics is the one called the Centre for Research on the Epidemiology of Disasters (CRED) in the Department of Public Health in the Catholic University of Louvain in Belgium. It has gathered numerical data on almost 16,000 natural and technological disasters in the world from 1900 to the present day. However, in all its publications CRED strongly recommends extreme caution in accepting any statistic about a disaster health consequence such as death and injuries totals at face value. Its web site ([www.cred.be](http://www.cred.be)) has an extensive list of caveats about its own data base. To paraphrase: the collector of the data reported may not follow rigorous criteria; data are often poorly reported; data may be skewed; data may be missing, etc.

Our own examination of similar kinds of statistics is even more dubious about the validity of such numbers noting that there can be variations of two to five times about statistics that widely circulate (Quarantelli, 2001; see also Aguirre and Quarantelli, 2008). In short, people and organizations that have assessed the numbers that are currently reported are very reluctant to use them for any serious purpose. (However, here and there rather sophisticated approaches to estimating, for example, economic losses to the US from hurricanes between 1900 to 2005 have been produced; See Pielke et al 2008). It is not that there is any objection to quantification or statistics per se. In fact, critics urge the development by researchers and governmental and relief agencies of better statistics. They do not currently exist and seem unlikely to be developed soon, although CRED does as good a job as can be done given the uneven quantity and poor quality of much of its data base.

Second, given the focus on catastrophes in this paper, it is important to note that statistics on them are probably even worse than can be found for disasters. There is simply more that can be damaged or destroyed. Additionally, the social setting mentioned earlier in which catastrophes appear often make any “numbers” questionable. The tsunami happened in developing countries which mostly do not even have good fundamental census data to start with. Similarly, at the time of the Soviet Union its census and health data were very suspect and while there may have been some improvement since, it probably is still rather problematic. Also, since catastrophes almost necessarily generate statistics gathered from multiple organizations using different criteria in different jurisdictions, whatever is produced is inconsistent at best. To this day, the reported casualties and losses with respect to New Orleans and Louisiana in Hurricane Katrina, which have been derived from many different sources, are far from consistent with one another. The reports of economic losses resulting from the northeast blackout vary widely.

Finally, there is a question if the conception of a catastrophe necessarily requires high death tolls and extensive property damage. It might seem that if there are rather high casualties and large property damage in a given occasion, it is likely to be a catastrophe. That would especially follow if high or large numbers are used as differentiating criteria for that kind of occasion. However, even rough numbers from Chernobyl on those initially killed and injured as well as property damage are surprisingly low (Russian disaster researchers have told us that despite the dubiousness of most statistics from the Soviet Union, the post Chernobyl numbers are reasonable “ballpark figures”). The possible later radiation poisonings that may have been resulting in child birth defects, a rise in cancer rates and other health problems seemed to surface more than a decade later. On the other hand, there is no doubt that in the immediate aftermath of the nuclear plant explosion there were very major social disruptions in parts of Russia and nearby countries, very similar to what happened in the immediate aftermaths of Hurricane Katrina and the Pacific tsunami. Therefore, it seems reasonable to classify Chernobyl when it happened as a catastrophe. Whatever may have surfaced a decade later is hardly what should be used for classification purposes, although from a research viewpoint it might suggest the need and value of studying longer run as well as shorter run quantitative outcomes of collective crises.

Overall, what can we conclude from the discussion in the last few pages? Ideally it might be desirable if a numerical index to characterize a catastrophe could be developed. But in terms of the current situation it seems out of the question with little probability something can be developed in the near future (Thomas, 2001). Seemingly the best that can be done at present is to use something like we have suggested. There is a catastrophe when, along with other social dimensions, a very large area is impacted that involves multiple land uses and diverse communities.

4. In a catastrophe, those persons or groups impacted perceive the threat to them and significant others as being of major magnitude. This may depend on visual perception of the death and/destruction around them, a belief in the drastic consequences of the risk

(e.g., a radioactive fall out) or communications from trusted sources that an immediate threat looms. Action is seen as called for, be it individuals or organizations.

The literature on immediate responses to disasters in particular is extensive. We use the research reported to discuss four issues. What differences, if any, are there in immediate responses in catastrophes compared to what happens in disasters with respect to the presence or not of panic, the surfacing of antisocial activities, the emergence of new behaviors, and the organizational problems that exist. In short, are these features of the immediate responses that can be seen in catastrophes and not disasters?

If a “panicky” response is the initial reaction by many to a natural hazard or technological risk, that could set the stage for very bad consequences in the immediate aftermath. For long, some--mostly non-social scientists--have argued that a panicky reaction could lead to a disintegration of the social order. In fact, it has been well documented elsewhere (Quarantelli, 2005), that the pioneer disaster research in the 1950s was pushed and supported by the American military because they thought the civilian population would collapse in panicky behavior in the face of a direct atomic attack on the US (Quarantelli, 2008). While the major possibility talked about is a conflict situation, some thinking in the Department of Homeland Security at the present time about all collective crises is not that much different than what was mistakenly believed five decades ago. In fact, at one off-the record recent meeting with a very high level DHS official, Quarantelli (personal communication) was asked how “panic” could be prevented among the American population in the face of non-conflict collective crises.

The same kind of thinking has spilled over into some current planning in the public health area for a non-conflict threat such as a world wide pandemic. To be fair, some crisis planners in that area have very strongly argued that the disaster research literature nowhere supports the notion that any kind of panicky response is likely. Also some contemporary popular writers (e.g., Ripley, 2008) who have correctly read the literature on behavior in disasters, have reported that while there is a very widespread belief that people often panic in crises, this is simply not what the research consistently shows.

The word “panic” and related terms is used in many radically different ways (see Blum, 1996 who for example equates “panic” with the desperate negative mood he sees prevalent in postmodern societies; for the large variety of ways the term is currently used see Mawson, 2007). However, most scholarly approaches equate it with flight behavior where social ties with others are abandoned or ignored. What about panic flight behavior as part of an initial reaction to a threat or risk? On this, our answer can be very clear and unambiguous as well as brief. Despite the ubiquity of the term “panic” (and its derivatives) in popular stories and press accounts of initial responses, and the expectations of some crisis managers and planners, panic flight is not a characteristic of catastrophes.

Our tsunami case is a good example to examine. Unlike Chernobyl where the risk was not even visible, or Hurricane Katrina where the flood waters made much of any kind of quick physical movement very difficult, the threat was visible and movement was

possible on the beaches in Indonesia and elsewhere. Press accounts of the time refer often to “panicky” flight. However, again numerous photos and films of beach locations do show people trying to flee away from the incoming tsunami wave or being engulfed by it. But almost without exception, those fleeing are trying to help one another, and in certain cases some in secure locations endangering themselves to try to help others caught up or falling in rapidly moving water. The very extensive helping of others is the very opposite of panic flight.

Panic may be the one word most often used in descriptions of all kinds of collective crisis events and occasions, but serious examination shows that such labeling is a myth. In fact, panic flight is extremely rare in disasters or any other kind of collective crisis situation. This has led one researcher to write:

We have found clear cut cases of collective panic flight in less than 100 disasters in a half century of professionally looking for the phenomena, and even in those cases usually only a very small minority of those present in the situation engaged in anything resembling panic flight (Quarantelli, 2008).

The last part of the quotation can be documented from the on-scene films of the 2003 Rhode Island night club fire (especially the outtake film) and the 1989 Hillsborough soccer stadium fire in England (the official inquiry has the best description of what happened, see Taylor, 1989, 1990). They show that there was some isolated panic flight in both cases, but also that most people in the situation tried to help others and did not act in an irrational manner. For example, a number of fans in the stadium can be seen as attempting CPR with others tearing down advertising boards to use as makeshift stretchers.

To conclude, whatever is involved in a catastrophe, panic in any significant sense of the term, is not present. The panicky initial reaction that is mistakenly attributed is nowhere to be found and thus can not be thought as a characteristic of such occasions. Barton half a century ago noted, and the point has been reaffirmed in numerous times since that: “most...systematic investigation of disasters indicate a rather low rate of non-adaptive behavior—panic, shock, hysteria, or other forms of personal disorganization” (1954:138).

Irrational panic or that it leads to irrational decision making or activities can be dismissed as a significant factor in the initial reaction to a major hazard or risk. But those who think human beings can not be depended to initially react well in collective crises, often fall back on the notion that whether or not there is irrationality, there is antisocial activity in such occasions. A question should be asked and researched by others why in much popular thinking there is this continual attribution of fragility and weakness to people faced with collective crises when the evidence is to the contrary (a speculative question posed decades ago by Wolfenstein, 1957).

So as a second issue, we can ask is antisocial behavior part of the initial reactions in a catastrophe? The answer to that question turns out to be rather complex. As a whole and generally speaking the answer is a clear no. However, antisocial behavior manifested in



looting can appear in catastrophes. But it turns out that a catastrophe can be a necessary but not a sufficient condition for looting. Other conditions in addition to the occasion being a catastrophe are required to generate looting (itself being mostly emergent behavior as will be noted later). Let us try to explicate what is involved.

Is anti-social behavior, especially looting, frequent and common in disasters and catastrophes? Does Mr. Hyde take over from Dr. Jekyll? Disaster movies and popular beliefs (as shown in reluctance or resistance to evacuating from a threatened or impacted locality because of a concern that one's possession might be looted) assumes such anti-social behavior is very common.

There are a limited number of empirical and theoretical studies of looting. There is more on looting behavior in civil disturbances than disasters because of scholarly interest in the 1960-1970 riots in American cities. But save for a study here and there, almost no systematic research by local scholars has been done on the topic in civilian disasters and crises outside of the United States (although American researchers have paid attention to looting other countries).

The overall conclusions from studies can be summarized as follows. Looting is unusual in the typical natural and technological disaster in modern Western type societies. But the picture seems to be rather mixed for other kinds of social systems with looting seemingly occurring not infrequently in developing countries. The latter observation however rests on press reports and accounts rather than from systematic research, although it is difficult to ignore photos and films that show open and obvious cases of massive looting (e.g. in catastrophes in Peru and Columbia earlier this year).

However, we found no credible reports of looting in our tsunami case which involved exclusively developing countries. In fact, almost all references to looting in press and other reports were just the opposite—explicit statements that no such anti-social behavior had occurred in the tsunami. There were a few reports of minor looting around the Chernobyl nuclear power plant complex, but it happened months after impact. Except for an isolated reference here and there about possible looting, the reports from all major urban areas in the power blackout was how pro social the behavior was, even in New York City. The one clear instance of massive (i.e. involving hundreds of participants) looting we had was in New Orleans in Hurricane Katrina. In our view, the press reports badly overestimated the degree and kind of mass looting that occurred and ignored the fact that such anti-social behavior was all but absent in the other impacted localities including southern Mississippi which suffered far more physical destruction than the New Orleans area. However, that said, without doubt, there was some massive looting in some limited locations of downtown New Orleans (contrary to what even some recent writings on the topic argue, see for example Constable, 2008).

How do we explain these findings? We can best do so by reporting on another catastrophe, namely what happened on St. Croix in the U.S. Virgin Islands after it was impacted by Hurricane Hugo. The physical damage across the whole island was tremendous with over 90% of all buildings being destroyed or damaged making what had

physically happened in New Orleans look almost benign. It was several days before any significant outside help started to trickle in unevenly. By almost any criteria the occasion was truly catastrophic for the residents of the island.

There were three extensive field studies (done by Quarantelli) with respect to the immediate response of the population and some of the major emergency organizations. A systematic quantitative survey was done on all businesses in the four shopping centers and malls on the island. One major finding was that there had been massive looting. Not only were all consumer goods in sight stolen, but there was even stripping of electrical and wall fixtures as well as ripping up floor carpets. The biggest mall with over 150 shops as well as two others were swept clean with less than ten percent of the businesses reporting they were not totally looted. There was indirect evidence that a majority of the population took stuff from shops. Some island police officers participated in the looting.

The looting was initiated by pre-impact gangs of delinquent youths who targeted stores with large stocks of consumer goods such as television sets (but not food supermarkets). The second stage was when initial non-participants with non everyday criminal lifestyles began taking goods from other locations such as hardware stores. Finally, a much larger number of residents joined in targeting shops with basic necessities such as groceries, but generally did not take items stolen by the first two sets of looters.

Anyone with real knowledge and understanding of what happened in parts of downtown New Orleans after Hurricane Katrina, will recognize the similarity to what occurred in St. Croix in the first 48 hours after initial impact. The major difference is that the mass looting in New Orleans was far less extensive and involved a smaller percentage of the total population.

Both occasions were catastrophes. But we know even just using the occasions mentioned in this paper, that mass looting does not occur in all catastrophes (and is almost non-existent in disasters in American communities). We advance the position that besides the necessary condition of being a catastrophe, there additionally has to be other sufficient conditions to tip the balance towards a major outbreak of looting. Both in New Orleans as well as in St. Croix there were these additional factors. They were a pre-impact concentration of disadvantaged persons faced with everyday perceptions of vast differences in lifestyle incomes, power and prestige; a subculture tolerant of minor cheating and stealing along with everyday organized youth gangs involved in serious crime such as drug dealing; and a local police force that was inefficient and corrupt.

What can we conclude with respect to looting and the characteristics of catastrophes? Simply put, if there is a catastrophe it can create a necessary but not a sufficient condition for the occasional emergence for major looting. It should go without saying that this statement requires systematic testing in other social systems and cultural frameworks different from the American social setting from which we have mostly derived this basic idea. But in terms of the focus of this paper, initial antisocial behavior manifested in looting is not a usual feature of catastrophes.

We turn now to our third question. Is there the emergence of new behaviors in the immediate responses in a catastrophe?

Contrary to some mythological popular beliefs, survivors of collective crises of the nature we are discussing are not stunned into inaction or passivity. Individuals are not dazed and unable to function in the new situation. The question of group or organizational response is more complicated as we shall discuss later, but it is not because of a lack of perception that attempting a response would be appropriate. The difference here is that individuals and small groups (a family or household) usually rise to the challenges of a perceived crisis, whereas formal groups and organizations sometime falter.

Again and again, study after study, has documented that survivors usually move to do what can be done. A good example of this is that by far the bulk of search and rescue activities, digging into debris, and heading the found injured towards medical treatment is mostly done by survivors looking for their family members, neighbors, coworkers, or those known to have been around the pre-impact physical location of survivors (Denver, Perez and Aguirre, 2007). Some of the photographs and films of the Indiana Ocean tsunami as it approached coastal areas and beaches show very many and very dramatic pictures in real time of what we have just said. Such persons are truly the “first responders”, both in terms of time duration and number of live and dead bodies found. Even the earliest disaster studies found that in the first half hour after impact usually about a third of survivors searched for missing persons, with about 10 percent taking an active role in rescue (Fritz, 1961). But such activities are seldom reported by the mass media that understandably focus instead on the formal search and rescue efforts of emergency organizations.

What students of collective crises of a consensus nature have consistently found for decades is what the earliest researchers ran across, namely a great deal of emergent behavior, two aspects of which should be noted. The behavior is of a collective nature, but not in the sense of any overall organization or coordination. Rather there are myriad small informal groupings and networks often unaware of what other similar entities are doing. The behavior is adaptive in that it is functional for the occasion and which arises because there are immediate problems that need “solving.”

This can be further documented in what happened in the New Orleans area in Hurricane Katrina. What we earlier characterized as what is seen in a catastrophe clearly was present in the multiple communities around the city of New Orleans. However, the overall response to that was not the disorganization, social chaos, and dysfunctionality that was the staple reporting by the US national mass media.

To be sure, certain government agencies in the area for all practical purposes ceased functioning. However, what emerged on a massive scale were smaller, informal entities and network linkages, sometimes but not always anchored in preimpact known groups. Researchers were able to find and to study this emergent phenomenon. For example, Disaster Research Center field teams were able to research what emerged in particular neighborhoods, among both informal and formal rescue teams, in some hospitals, and in

chain linked hotels (see Rodriguez, Trainor and Quarantelli, 2006). There were literally hundreds of such new groupings in and around New Orleans, including many studied by other scholars especially in the religious sector (both from within and outside the large directly impacted area). In addition, popular lay accounts of participants in other places such as city hall and a major jail provide further indications of how widespread prosocial emergent behaviors were in this occasion (see Forman, 2007 and Inglese, 2007).

Emergent behavior occurs even in small disasters. So is what we have observed in the catastrophes we have examined different in significant ways from what appears in disasters? Certainly it appears that there is both more and more diverse emergence in catastrophes. This is even truer if we had focused on the tsunami rather than the hurricane. Thus, if sheer numbers and extreme diversity are our criteria we could say that catastrophes are to a degree different from disasters in terms of initial responses to impacts. But we can see where other analysts might disagree with our conclusion on this point. A legitimate question might be ask to what degree, to what extent are there enough either qualitative or quantitative differences to be able to say that these are characteristics of a catastrophe rather than just a disaster?

It never should be forgotten that almost all emergent behavior at times of collective crises is a very good and is a positive adaptation to immediate problems that need attention, such as the search and rescue efforts illustrated above. The only exception to this is the rare emergence of mass looting that however requires other conditions in the larger social setting for that behavior to emerge even in a catastrophe. That said, if emergent behavior at the time of an initial response to a collective crisis is generally adaptive, it can not be seen as something that would further the development of a catastrophe. In other words, initial emergent behavior if it is present would generally work against the development of a catastrophe.

Finally, we turn specifically to analyzing the initial organizational behavior in catastrophes. The literature on the reactions of organizations to crises is rather substantial (e.g. Kreps and Bosworth, 2007, systematically analyze over several decades numerous studies using one major theoretical framework; see also Tierney, Lindell and Perry, 2001 for a more general review).

Local organizations are the heart of activities at the community level, at least in American society. For the purposes of this paper, all such organizations in urban areas can roughly be classified into three categories. First, there are a number of crises or emergency oriented formal groups such as police and fire departments, the local emergency management agency, general hospitals, and the local Red Cross chapter. These have not been recently studied very extensively, but earlier DRC studies found wide differences in functions and activities in disasters in those communities. Probably this is still the case. Second, there are local organizations both public and private that have specialized collective crises responsibilities. These include the public utilities, local chemical and nuclear plants, public health departments and the local weather service. DRC in the past found that as a whole many local entities were well prepared and often responded well in local disasters as long as they operated within their specialized areas

of expertise. Third, there are all the other local organizations. Light (2008) recently looked at surveys of their crisis preparedness. He found that while there has been improvement over the past, and that trend is increasing, and there are exceptionally good cases of preparedness here and there, as a whole only a very small minority of these other organizations paid much attention to crisis preparedness of any kind. Runyan (2006) in a separate study done a year after Hurricane Katrina found that less than 12 percent of small businesses surveyed in the Gulf Coast states had formal disaster plans.

Our approach to this body of knowledge and the analysis we made of the four major crisis occasions we have used throughout this paper was somewhat selective. Barton (1969) a long time ago suggested that organizational behavior in collective crises revolved around the mobilization of the organization, its efforts to mobilize personnel and resources. Out of many possible choices, we chose to focus on three specific topics as illustrative of what might be partially involved as sources of catastrophes. In question form: First, in a catastrophe is there anything distinctive about the initial communications about the threat or risk involved? Was there a warning system and how did it work? Second, what planning, if any, existed to move people away from the danger? Was there any kind of evacuation plan and was it implemented? Third, given the myriad organizations likely to be involved, what was visualized as to the nature of the coordination that would take place? Was interorganizational coordination planned for in any way?

What about warning systems? The Soviets had no system in place for warning distant localities about a radiation risk from an accident at the Chernobyl nuclear plant. There seems to have been a mostly untested and therefore mostly unknown plan in place for alerting the surrounding population. While there were a number of technical monitoring mechanisms in place within the nuclear plant complex itself to indicate serious malfunctions or danger, as far as is known, they were mostly misread or ignored although plant personnel in the control room knew rather quickly that something very bad was happening and accelerating. On top of everything else, most of the authorities, local and otherwise, tried to keep the developing risk as secret as possible. Thus, for all practical purposes, there was little by way of a warning system.

In contrast, in Katrina, there was a long range hurricane warning system in place. For the most part, the National Weather Service provided continually up dated forecasts of the incoming hurricane. The handling of warnings at the local level was somewhat more problematical, with some officials dismissive of them as, to paraphrase, “just like all the hurricanes New Orleans survived in the past”. However, far more serious, the warnings issued were about the possible impacts of heavy rains and high winds but little at all was said about the flood waters that would inundate most of New Orleans if the levees were breached or topped (as did happen). So the warning system in place worked reasonably well. But there needed to be warnings about a possible flood and these were issued late and somewhat erratically.

As to the tsunami, there exists no formal international warning system in the Indian Ocean as exists in the Pacific Ocean. As far as can be ascertained, almost all

organizations initially learned of the threat from press reports. We found no data indicating that specific emergency organizations in the-to-be impacted communities had plans for issuing warning for a tsunami.

What about evacuation planning? Obviously a way of dealing with a threat or risk is to move people away from the danger. Many social systems and local communities as well as emergency oriented organizations have elaborate evacuation plans which they, at times, have successfully implemented in actual crises. This is something which can be done and has been done. In fact, although often overlooked because of the mass media attention to the disadvantaged underclass who were trapped in parts of New Orleans during Hurricane Katrina it seem that probably close to a million residents of the Greater New Orleans area more or less evacuated on their own. This is far more than the 30, 000 evacuees temporarily housed in the Superdome and the 10, 000 in the Convention Center in New Orleans. However, it is a gross understatement to say these people were very badly treated. For how unprepared New Orleans was for such evacuees see the case studies in Senauth, 2007 as well as Kiefer and Montjoy 2006;124 for the evacuation in place that occurred. So while along one line a case could be made that an overall successful evacuation took place in the New Orleans area, major policy and management issues are raised by what so dramatically went wrong for those trapped inside the city (it should also be noted that it appears that even overall evacuation did not occur or was miniscule in many cases in the hardest hit areas in southern Mississippi).

What about interorganizational coordination? This is often a problem even in ordinary disasters. However, catastrophes typically involve multitudes of organizations in different formal jurisdictions. That compounds the problem of coordination. Hurricane Katrina, the Chernobyl nuclear accident, and the Indian Ocean tsunami abound with incident after incident where there was lack of interorganizational coordination. Wolshon (2008) in a recent publication suggests and implies that in recent and upcoming megadisasters that are somewhat regional in nature, there are many coordination problems because of the multiplicity of responding groups involved that operate in often different governmental jurisdiction, and a cutting across of bureaucratic boundaries.

What can we conclude from our examination of some of the initial organizational behaviors in our four cases? There were either no relevant plans or poorly implemented planning for warning people and localities of the actual oncoming or developing threat. The same can be said for mass evacuation on the scale that was at first needed. The great number of organizations that were heavily involved either did not coordinate or had poor coordination. Now organizational responses in disasters is typically far from perfect, but there has been more than isolated instances of where warnings have been very good, where mass evacuation has gone well, and where there has been adequate interorganizational coordination. In contrast, these activities do not seem to go well in catastrophes. It appears that this is a qualitative difference between disasters and catastrophes.

Our view is that pre-impact poor planning and/or crisis time poor implementation of plans is a partial source of catastrophes. This is what is crucial in the initial reaction to a

collective crisis. Panicky responses or anti social behaviors are either non existent or irrelevant to the presence of a catastrophe. While emergent behavior is clearly and heavily present, if anything, it usually works against the development of a catastrophe. However, if the poor or inadequate planning more than balance off the social emergence process, the situation is created for the development of a catastrophe.

Finally, how can we summarize our conclusions about the generic characteristics of catastrophes? In just one sentence, we say they involve only significant natural hazards and risky technologies, that impact relatively quickly, on a very large area with multiple land uses and diverse communities, and where organizational and interorganizational collective crisis planning is not very good. This should be understood with all the qualifications and caveats that the previous detailed discussion advanced.

### Short Term Consequences

We have just finished discussing the salient characteristics of catastrophes. All comparisons with disasters were solely in terms of characteristics. We turn now to exploring hypotheses about consequences where there again is an explicit comparison with disasters. But this time the focus is on consequences and not characteristics. The two should not be confused.

Catastrophes undoubtedly have more serious consequences than disasters. It is possible to see that in a catastrophe most everyday community functions and social institutions are sharply and concurrently interrupted. However, it is important for the purposes of this paper to note that it is group life and social linkages that are disrupted rather than what happens at the individual level. In terms of everyday life, the routines of some individuals on an everyday basis have often to be set aside. But it is different when the disruption is at the group and social network levels. The community can function when everyday routines of some individuals are set aside. However, it can not function as usual when group and network routines can not be followed, as we shall now discuss and exemplify.

1. In a catastrophe in contrast to a disaster we hypothesize that there will be cessation of operations or massive reduction across-the-board in normal organizational and work routines. A good example of this is what happened in the massive flooding in 1953 in Holland where at least one sixth of the land mass of the county was totally inundated (see the four volumes published by the Committee on Disaster Studies, 1955). There was cessation of most human and group activities not only in the flooded communities, but there was also major social disruptions elsewhere in the county as a result of efforts to deal with arriving evacuees as well as the mobilization of the Netherlands as a whole in a massive attempt to cope with a total system crisis. Similar massive disruption in many sectors of organizational and community life appeared in our four cases, even in the blackout where there was not any physical disruption per se but the lack of electricity literally shut down very many everyday activities and processes. In this last case, the absence or interruption of one critical infrastructure set off a cascade or chain reaction that negatively affected myriad networks that had not been directly impacted by anything.

On the basis of what we have just written we are hypothesizing that what partly occurs in a catastrophe is that many community organizations, including emergency oriented ones, either cease operating or do so in a markedly reduced manner (in contrast to a disaster where few organizations in a community deteriorate to such a degree). If that is true, this raises policy issues such as whether local communities have to have two somewhat different kinds of crisis oriented agencies? In fact in many societies there is a tendency to have such a differentiation for riots and conflict situations in contrast to natural disasters. In conflict situations, at the local community level, the police and other social control agencies as well as some parts of the military such as the National or Home Guard are likely to be the lead organizations and have the major responsibilities, in contrast to where emergency management or civil protection organizations have the major responsibility for planning and managing occasions involving natural hazards or technological risks.

Where this discussion especially becomes pertinent is at the national level. In a catastrophe, multiple organizations in widely dispersed communities in different governmental jurisdictions are impacted. We might note how this problem is currently addressed as well as the problems that ensue in the United States. As it turns out, both can be seen in the aftermath of Hurricane Katrina, one of our four major cases. American society after the 9/11 terrorist attack established a new Cabinet level organization and called it the Department of Homeland Security (DHS). Its overall mandate was to deal with major if not catastrophic conflict situations especially those associated with terrorism. The prior existing agency for dealing with national level crises, called the Federal Emergency Agency (FEMA), was incorporated at a somewhat lower level into DHS. Its general mission and experience was to help respond to disasters involving natural hazards and technological risks. The great majority of researchers interested in disasters and catastrophes thought and said that what was planned and implemented was not consistent with research findings. In addition, it was again pointed out that the earlier unresolved question of how similar and different conflict and non-conflict crises were was never explicitly addressed.

While it is not the purpose or goal of this paper to address the last question, it does have to address a parallel issue, namely to what extent disasters and catastrophes are similar and different. If the differences are significant enough, as we indicate elsewhere in the paper, then there is the question if two different crisis planning and managing agencies are required? The United States has indicated by its actions with respect to DHS and FEMA that the problem can be addressed by having one primary agency with the other one subordinate to it. We think there are enough problems with that solution to suggest considerable more thought need to be given to the problem. It is a fundamental policy issue that can not be ignored.

Apart from policy issues, there are operational questions as how to plan and manage for catastrophes. Is another implication that local emergency managers have to plan differently for their procedures when all or most key local organizations are not operating or at drastically reduced capacities in catastrophes? In a catastrophe in contrast to a



disaster we hypothesize that on a large scale, normal work roles can not be undertaken. It is not a matter of role conflict or abandonment, but that there are many everyday roles that are simply not available to be meaningfully played. If a school or hospital has been damaged enough so that it can not be open, teachers or medical personnel can not play their usual work roles in such catastrophes.

2. The mass convergence of people, things and communications into impacted communities was identified as an almost universal happening by the earliest disaster researchers (Moore, 1958). If anything, in more recent times, there is more convergence than ever before. However, researchers have been increasingly observing that in a catastrophe in contrast to a disaster, because of the larger area impacted, a substantial majority of the aid and help has to come from more distant localities away from stricken localities. Even when there is assistance from very nearby communities, it is increasingly and proportionately less of the mass convergence. In a true catastrophe, at the heart of the most impacted areas, almost all of the mass assault has to come from the outside. In Hurricane Katrina, almost all of the communities in heavily impacted southern Mississippi could not and did not get help from one another. It should never be forgotten that local residents and groups that survive, even at the very center of the devastation, do slowly start to help one another as we have discussed elsewhere in this report as the universal phenomena of post-impact emergent behavior. Nevertheless, the predominance of distant outside help is a characteristic of postimpact behavior.

There are complicated emergency management problems that stem from this occurrence. Let us just note three. For one, it is for obvious reasons very difficult to plan ahead of time for such contingencies.

Second, when the “outsiders” come in they are less likely to have prior network linkages and/or familiarity with the impacted area and local persons. That very fact alone means that the efficiency and effectiveness of the effort is likely to be less than when assistance comes from within impacted communities or their closest neighboring localities.

Third, the pioneer disaster researchers found that when outsiders came in to help that almost inevitably some tensions developed between the local people/organizations and the “outsiders”. From a managerial viewpoint what is the way to handle such a problem in a catastrophe?

3. In a catastrophe in contrast to a disaster, we hypothesize that there will be social construction of the social occasion by non-local mass media reporting on what is happening and where. Extensive reporting on disasters and catastrophes has existed since the development of printing and the increase of literacy, and has accelerated substantially with technological developments that have led to the mass media, a phenomenon only about 150 years old.

What are the policy issues raised by the fact that most everyone, including top government officials both within and outside the impacted areas in the catastrophe have to depend as well as to deal with the fact that a relatively independent institution, the

mass media or mass communication system in the society, creates the perceived social context of what has happened? The nature of the relationship between the governmental structure and the media system can vary considerably. In democratic societies such as those in Western Europe and the United States and Canada, nominally at least the media system is independent from direct control by the governmental structure (interestingly this is less true for conflict situations such as terrorism, attesting to the fact that there are policy implications from the media socially constructing the nature and the meaning of the crisis and thus setting forth part of the social climate in which the government has to operate). In less democratic societies the government tries to provide the “social climate” that the media is supposed to set forth. There are limits to which this can be done. A consequence of trying to dictate from the top down is that a vast number of rumors emerge that informally try to present an informal social construction of the crisis.

There are also operational problems in that the media construction of the crisis occasion can lead to misuse of resources and attention. As already noted, media reporting in Hurricane Katrina focused on the immediate New Orleans area, and mostly ignored the more heavily impacted communities in southern Mississippi. It is very difficult to draw up emergency operational plans that can deal with such a problem. Thus, in a catastrophe compared with a disaster, it is more likely that there will be uneven media coverage of the local communities impacted.

4. In a catastrophe in contrast to a disaster, we hypothesize that while all disasters and catastrophes involve the political arena, catastrophes bring about involvement at the national and in some occasions at the international level.

The very act of political intervention is a policy issue. Such an intervention should not be seen in the name calling sense which sometimes is used by lay persons. Instead as political scientists will attest, the political arena is the major institutional area or sector in all societies where different or competing points of view clash and where sooner or later important decisions emerge. To dismiss such activities simply as “politics” misses the very important point that to fully understand catastrophes requires research that establishes who are the contending parties or stakeholders, what power or influence they have, the nature of the struggle that goes on, and who are the winners and losers.

At the more operational level, sophisticated emergency planners and managers of course have to be good “politicians”. Again this never shows up in local community disaster plans. However, any effective planning will implicitly have to consider the crucial political nature of catastrophes since that affects the whole cycle from mitigation to preparedness to response to recovery.

### Past and Current Catastrophes

Since we use recent or current examples, it might be thought we are suggesting catastrophes are products only of the modern world. That is not our position. Of the dimensions we discuss, only the social construction of the occasion by modern mass media technology may be absent in earlier societies.

But how far back can we go? The San Francisco earthquake and fire of 1906 was clearly a catastrophe even just using only the four characteristics of catastrophes we discussed earlier. Actually the name of the city, San Francisco, attached to the occasion, is a misnomer. The earthquake impacted other cities and towns around San Francisco. But just as New Orleans became the major focus of the mass media in Hurricane Katrina, San Francisco became the major location of attention by the print media in 1906. One of the authors of this paper (Quarantelli) for another research goal a few years ago examined several hundred newspapers and magazines published in the several weeks after the date the earthquake and fire occurred. Apart from the local press (in California), major newspaper in Chicago and Middle America as well as in New York and other Eastern cities socially constructed what had supposedly happened in San Francisco. Overall, most newspapers and even magazines of that time period were of the “yellow journalism” kind. Very many stories printed stressed the sensational and accounts were often very factually incorrect. That aside, the San Francisco earthquake and fire was treated as a national story. Given this example from over a century ago, we can say that hypothesis # 4 is probably not valid just for today.

But probably this is the outer past limits for the role of the print media in defining catastrophes. It was the 19<sup>th</sup> Century when at least a degree of literacy became relatively common which also brought into being the “penny” newspaper. Until catastrophes in the 18<sup>th</sup> Century and earlier are studied in detail we do not know if hypothesis # 4 was handled in some other way, or if not, how the nature of catastrophes was changed in comparison to disasters.

At a very impressionistic and not specifically studied level, it is difficult for us to believe that catastrophes only came into being in the last two hundred years. Popular accounts of some volcanic eruptions, as well as major urban fires that burned most of ancient Rome and London would seem to suggest that it would be possible to find earlier catastrophes. The 1556 Shaanxi earthquake, usually categorized as the mostly deadly sudden crisis of all times in that 800,000+ people were killed in at least ten provinces of China and affected cities 310 miles apart, just on the basis of those figures alone could be treated as a catastrophe.

How far back has the world really been faced with catastrophes? Has the social nature of catastrophes changed? If so, in what ways? We already have implied that with the advent of the mass media, of necessity the social construction of them, how they were viewed had to change. Answer needs to be sought empirically, by scholars doing systematic historical case studies and not by any dogmatic proclamation.

If part of the past is problematical, what can be said of the future? Are at least some catastrophes going to be different? It would appear that this may be the case. If nothing else, it is difficult to believe that the transnationalization and globalization that the world is undergoing (see Hofmeister and Breitenstein, 2008) will not make a difference for future catastrophes. At the very least, such global transformations will provide somewhat

different social settings than are currently available for natural hazards and risky technologies to impact.

While the relevant literature is not large, some writers have speculated that there may be some disasters/catastrophes in the future different in significant ways from what appears today (for humorous but still-on-target critiques of such possibilities see Easterbook, 2003). There have been suggestions of new sources of threats or risk such as from nanotechnology, genetic engineering, robotics and other computer related possibilities (Joy, 2000). Some scholars have focused not just on relatively new potential sources but also on the newer social processes of how the new threats and risks evolve or develop (see Quarantelli, Lagadec and Boin, 2007).

The notion has been advanced that there is now the possibility of trans system social ruptures (TSSR). TSSRs disrupt the social fabric of distant social systems with the threat jumping across many international and national political governmental boundaries. The risk spreads rapidly, illustrated by the example of SARS going from a rural area in China to metropolitan Toronto in less than 24 hours because it was carried on a plane flight to Canada. There is no known central or clear point of origin, at least initially along with the fact the possible negative effects at first are far from clear. There are potentially if not actually a huge number of victims, directly or indirectly (like much of the earth's population from an out of space large object such as a huge meteor hitting the globe). Traditional local community "solutions" are not obvious for TSSRs as evidenced in current public health planning for a pandemic. Finally although responding organizations are major players, there is an exceptional amount of emergent behavior, and the development of many informal ephemeral social linkages (especially informational networks).

If the above are truly the characteristics and consequences of TSSRs, are we talking about mega catastrophes? The issue of course is not the label "mega" but whether some of the social phenomena involved are different from what is seen in a catastrophe as this paper has discussed. The meteor threat or a global pandemic as well as some computer related risks which recently have been increasing (see Markoff, 2008) would seem to go beyond the four catastrophes we have used as our core data. However, this issue can not be settled in this paper. But to us, there are more than enough problematical questions that can be asked, to argue for more intensive study of the issue.

It should be noted that this interest can be seen as part of a much larger trend to looking at threats and risks that some scholars see as facing the world such as climate change, a lagging energy supply, and depletion if not destruction of vital food resources. A semi-organized group with such a focus has even coined a term to apply to all such dangers, namely "planetary emergencies" (Revkin, 2008:11). While some of the negative projections seem almost along the line of an implausible mantra that "the sky is falling", others appear to be reflecting the increasing awareness which has developed in some scientific and other intellectual circles that the human race is faced with possible challenges to its very existence. Even some of the most extreme scenarios discussed are not scientifically impossible (see some of Lee Clarke's writings where he discusses very

low probability but still plausible scenarios). In this perspective, while catastrophes in our sense of the term are visualized, they are not seen necessarily as the worst cases possible. For example, highly classified studies, undertaken for more than two decades, by American security agencies of electromagnetic impulse (EMP) cases suggest the possibility of a close to a near extinction of much of the human race and a regression by survivors to an extremely primitive level of existence.

Finally, we should note that in some basic way, the importance of studying catastrophes is not in their sheer number but in terms of both the short run and long run consequences of such occasions. For example, in the last seven and a half years (2000-2008) the US federal government has declared 422 major disaster declarations --the legal term required by law—(Bogues, 2008). By almost any criteria, only a handful of them such as Hurricane Katrina and the Iowa floods of 2008 could be called catastrophes. It is probably true, that the number of catastrophes would be higher if the previously mentioned CRED figures were used. Nevertheless, catastrophes are actually a very small number of occasions, a very small fraction of all collective crises involving natural hazards and technological risks. Yet there is disproportionate negative effects when compared with disasters in the numerous shattered lives, massive suffering, economic losses, psychological trauma, etc. that catastrophes entail. In the long run, papers such as this one are aimed at reducing these kinds of costs and are not intended to be solely academic exercises.

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