

**Time is of the Essence:
Disasters, Vulnerability and History¹**

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As an historian whose interests lie in both contemporary disaster practice as well the historical roots of vulnerability, I have become increasingly intrigued by the manner in which the proponents of these two 'fields' approach the question of time in relation to disasters. Needless to say these actors regard it very differently. Social scientists (and here I include mainly sociologists, anthropologists and human geographers) largely pay lip service to its importance, at best mentioning its relevance en passant but giving historical analysis and specific historical example little real consideration in the greater scheme of things. At the same time, though, they place inordinate emphasis on the importance of 'process' as the basis upon which their understanding of what turns a natural hazard into a disaster depends. The concept of vulnerability is proposed as the key to understanding how social systems generate unequal exposure to risk by making some people more prone to disaster than others, a condition that is largely a function of the power relations operative in each society (Cannon 1994:14-15, 19; Wisner 1993:131-133). Vulnerability to historians, on the other hand, is not even really a conceptual term and, when used at all, usually indicates a state of being not a condition derivative of historical processes. Above all, disasters are primarily 'events' caused by a combination of seismological, meteorological or epidemiological agents (occasionally war is seen in this context as well)² that have certain detrimental physical and socioeconomic consequences. At their most extreme, they may even cause the downfall of societies. However, they are rarely integrated into any wider theoretical perspective (Ambraseys 1971; Landsberg 1980). Though both social scientists and historians may talk about disasters, they are not necessarily talking about the same thing: the one sees disasters as primarily a historical

processes (or processes set within recent temporal parameters), the other as non-sequential historical events. This is unfortunate because primarily disasters are both historical processes and sequential events. If this assertion sounds rather convoluted, I trust the following discussion will make the distinction somewhat clearer though no amount of clarification is really sufficient to adequately address this question. Instead, I intend what I say more as 'a line of thinking in progress' than 'a work in progress'.

Vulnerability and the Social Scientist

The interest of the social sciences in the socioeconomic and psychological disruptions caused by extreme events really have their origins in the saturation bombing campaigns carried out by Allied air forces during World War Two, particularly the United States Strategic Bombing Command.³ The objective of the military analysts was to target the vital links in the industrial and economic structure of the enemy and, in the process, destroy the will of its people to resist. Interest in the effectiveness of the Allied air effort against Germany led to the compilation of a massive report not simply on the physical effects but also on the psychological and morale impact the bombing had on war industries and civilian populations. The survey was subsequently enlarged to include the Pacific War and its effects on Japan (USSBS 1946-47). In the immediate post-war period, much of the research into how people behave under stressful conditions was funded by military and government agencies required to formulate contingency plans under the threat of nuclear devastation (Hudson 1954; Williams 1954; Form et al. 1956).⁴ Most notable among such projects were the NORC (National Opinion Research Center) studies paid for by the (US) Department of the Army that entailed interviewing nearly a thousand people involved in different major or minor disasters (Fritz and Marks 1954). These sources, moreover, have continued to be important funding bodies. The recently conducted study on the national security implications of sudden climate change brought about by the anticipated collapse of the thermohaline circulation in the North Atlantic was CIA-sponsored (Schwartz and Randall 2003). Such initial military roots, though almost completely forgotten and very little appreciated, continued to exert a disproportionate influence on the shape, form and content of disaster-related research during the ensuing decades.⁵ In particular, the pre-occupation with physical damages and on statistics of all descriptions, both as assessments of loss and as measurements of recovery, probably owes its origins to these beginnings.

The identification of disasters as purely physical occurrences (typhoons, floods, earthquakes and initially also bombings and explosions) that affect

people who have the misfortune to be simply in the wrong place at the wrong time gave rise to a preoccupation with technological solutions for the protection of infrastructure and exposed populations. It also encouraged a way of seeing things that emphasized returning societies or communities to 'normalcy' as quickly as possible, a state viewed as equivalent to the restoration of the status quo and existing services (White 1974; Bryant 1991; Smith 1992; Alexander 1993). While the idea that disasters are simply unavoidable extreme events that require purely technocratic solutions does insufficient justice to the more complex intellectual genealogy of this approach, nevertheless it remained the dominant paradigm within the United Nations and many multilateral funding agencies such as the World Bank for many decades (Mitchell 1988: 25-29; Varley 1994: 3). Far from being discredited, such views have proven surprisingly enduring and are still very influential at the highest levels of national and international decision-making such as in the United Nations' decision to declare the 1990s as the *International Decade for Natural Disaster Reduction* (Hewitt 1995: 118; Cannon 1994: 16-17; Lehat 1990: 1).

Some social scientists, however, began to question whether the greater incidence of disasters since the 1970s could be attributed solely to a rising number of purely natural physical phenomena and to increasingly view society's exposure to hazards in terms of its vulnerability. Proponents of vulnerability as a conceptual explanation take the position that while hazards may be natural, disasters are generally not. As a concept, vulnerability offers a radical critique to the prevailing technocratic paradigm by placing the emphasis on what renders communities unsafe, a condition that depends primarily on a society's social order and the relative position of advantage or disadvantage that a particular group occupies within it (Hewitt 1997: 141). Vulnerable populations are those at risk not simply because they are exposed to hazard but as a result of a marginality that makes of their lives a 'permanent emergency'. This marginality, in turn, is determined by a combination of variables such as class, gender, age, ethnicity and disability (Wisner 1993: 131-133) that affects people's *entitlement* and *empowerment* or their command over basic necessities and rights (Hewitt 1997: 143-151; Watts 1993: 118-120). The emphasis is clearly on process, the combination of factors, both physical and human, that come together at a particular time and place to expose some people to the effect of hazards.

The element of process, however, has always been present in the social scientist's view of disasters though its elaboration may not always have been clearly stated. The strategic bombing survey reports were equally concerned with the impact military operations had on civilian morale: the disruption to essential services and the psychological consequences of fire-storms, the violent hurricane-like drafts caused by dropping large numbers of incendiary

devices.⁶ Interest was not limited to physical damages but also to effects on behavior. Already in 1954, Harry Williams strongly argued that:

Disaster research has not been, and should not be limited to field study of actual disasters. In one direction, there are important studies to be made in the areas of demography, urban geography, ecology, social psychology, social and political organization, and economics, using data acquired from other sources (Williams 1954).

This emphasis on the multifaceted or on process, how disasters are constructed and how risk is generated through a variety of factors acting one upon another becomes even more pronounced among those social scientists who propose vulnerability as the appropriate conceptual tool to the better understanding of such events. At the same time, though, this approach necessitates a change from regarding disasters purely in terms of their impact on the functioning of social systems, the adaptation of existing social organizations or the emergence of new ones capable of dealing with altered circumstances, to one that perceives communities as having greater or lesser capacity to withstand hazards and a degree of resilience to recover from their effects. It is the increasingly sophisticated comprehension of such processes that lie at the root of the formulaic expression of risk as equal to 'hazard x vulnerability/capacity' or one of its variants. Moreover, it indicated a clear break with the growing pessimism and rising hysteria of the Cold War years when the survival of part or any of the human race popularized *neocatastrophism* as an explanatory paradigm (Dury 1980).

Now there is more consideration of time as a factor in its own right here. The observation that human and material losses from natural hazards increased over the twentieth century without conclusive evidence of a corresponding rise in the frequency of such events, and that the same phenomena caused vastly different outcomes both between and even within societies, drew attention to the need to view disasters from a wider societal and historical perspective (Hewitt 1997: 11). Vulnerable populations are created by particular social systems in which the state apportions risk unevenly among its citizens and in which society places differing demands on the physical environment (Cannon 1994: 14; Wisner 1993: 134; Hewitt 1995: 119, 1983). Central to this perspective is the notion that history prefigures disaster, that populations are rendered powerless by particular social orders that, in turn, are often modified by their experience of these events to make some people even more vulnerable to them in the future (Blaikie et al 1994: 5-6). An appreciation of time, in particular the structural role played by external and internal colonialism as factors in determining disaster, is clearly at the heart of referring to earthquakes in Peru (1970) as '500-years in the making', in Guatemala

City (1975) as a 'classquake' or to the origins of the one in Mexico City (1985) (Susman et al. 1983: 277; Oliver-Smith 1994; Blaikie et al 2004: 281-292). The importance of history is also strongly present in what has been termed the Access Model of disaster causation proposed by Amartya Sen in *Poverty and Famines: An Essay on Entitlement and Deprivation* (1981). Here vulnerability is regarded as generated by the difficulties some social groups or families have in accessing certain resources over time, a condition that is determined by identifying both the limitations and facilities through which accumulation is achieved and capacity is decreased when faced with disasters. Risks are different for everyone even in the face of the same hazard and depend on the capacity of each family (and even individual members) to absorb its impact. In other words, how people's circumstances (their pasts) have brought them to that state at that particular time and place. Anthony Oliver-Smith refers to this as a historically produced pattern of vulnerability and argues that 'the life-history of a disaster begins prior to the appearance of a specific event-focused agent' (1999: 29-30).

This awareness of time as part of a process that constructs vulnerability and generates disasters is incorporated into the traditional emergency management cycle that forms the basis of how such events are normally perceived. The origins of this model can be traced back to Anthony Wallace's study of the impact of a tornado on the town of Worcester in the USA. He identified various temporal stages in the onset, duration and recession of such phenomena that he equates with the steady state, warning, threat, impact, isolation, rescue, rehabilitation and irreversible change (Wallace 1956: 7-12). Disasters have been subsequently schematically rendered as part of an open ended process whereby mitigation (minimizing the effects of a disaster), preparedness (planning how to respond in case of disaster), response (efforts to minimize the hazards created by an emergency) and recovery (or returning the community to its previous state often described as 'normal') form a sequence of actions that barely distinguishes between a pre-disaster risk-reducing phase and a post-disaster recovery one. While the temporal dimension of disasters is suggested by the notion of a cycle, there is no suggestion, however, of the wider context within which this process takes place. I would argue that it is basically a historical. To use a rather crude analogy, disasters are depicted here much like the firing plugs in an engine that produce the spark that makes the pistons go up and down. While the notion of locomotion is acknowledged, there is no sense of direction, either of origin or destination. At best, disasters are depicted as triggers, causal agents that accelerate processes of change already underway in society, and where change itself is likely to precipitate further changes. Of course, this is no mean insight. William Lessa's path-breaking study of the small Pacific island community of Ulithi in 1960 showed how Typhoon Ophelia influenced changes in dress, housing, food,

gender roles, taboos, land use, leadership roles, led to increased 'urbanization', and to the monetarization of this isolated atoll. More importantly he was able to compare the 1960 typhoon with a previous event in 1907 that apparently caused no such appreciable effects and to theorize that disasters do not necessarily lead to permanent changes in closed societies but only in those already in a state of flux. Importantly, he emphasized the value of studying individual and group reactions in their particular context (Lessa 1964). With this approach, we are getting nearer an appreciation of how disasters act on society over time as historical agents (triggering change or reinforcing continuity?). Moreover, it raises the important question of what constitutes a base-line or anchor from which to compare or assess the degree and direction of that change.

The disaster management cycle has been criticized for its depiction of stages that follow one another in sequence when it is evident that such phases cannot be so clearly differentiated from one another and may actually happen simultaneously. A much more sophisticated understanding of the sequence of causality is apparent in 'the chain of explanation' underlying the Pressure Release Model (PAR) presented by Piers Blaikie et al. and its elaboration in conjunction with the Access Model incorporating many of the notions proposed by Sen (2004: 49-124). The PAR is based on the idea that an explanation of disasters necessitates tracing the connections that link the impact of hazards on people with the series of social factors and processes that make them vulnerable. These unsafe conditions are the product of pressures at the global, intermediate and local levels that intersect with physical hazards to create disasters. Global level pressures or 'root causes' are the interrelated set of widespread and general processes operative within society and the wider world that reproduce vulnerability over time and are reflected in the distribution and exercise of power and the relative marginalization of certain groups. Intermediate or 'dynamic' level pressures (including epidemic disease, urbanization, conflict, foreign debt, certain economic policies and environmental degradation) translate, so to speak, the root causes into particular forms of unsafe conditions. Local level pressures or 'unsafe conditions' are the specific forms in which a particular group's vulnerability expresses itself in hazardous living conditions, dangerous livelihoods or inadequate food sources and equates with social fragility, potential harm and poverty. Vulnerability at the local level is further amplified by the differential access that certain people enjoy to the material, social and political resources that circumscribe the manner in which they are able to earn a living. The 'chain of explanation' articulated here confers recognition on the significance of temporality, a dimension that achieves further elaboration with the acknowledgement that 'these pressures are all subject to change' and 'are probably changing faster than in the past' (Blaikie et al. 1994:26). Moreover, the authors go on in the

revised edition of *At Risk: Natural Hazards, People's Vulnerability and Disasters* to identify time as 'of the essence' to an understanding of disasters as it not only provides the framework within which the succession of events in a process can be analyzed but it also determines the frequency, time of day, seasonality and stage of impact (Wisner et al 2004: 106-107).

While this recognition of the temporal dimension is a major advance on previous treatment of the relationship between time and disasters, it is still basically an a historical terminology. It is a historical not so much at the level of conceptualization, 'root causes' have an implied historicity about them, but at the point of application because it fails to identify the specific events that cause hazards to become disasters. Its encompass is too broad to be truly historical. Dynamic level pressures, on the other hand, that are supposed to translate root causes into particular forms of unsafe conditions tend to reduce history to a set of inappropriate development interventions. As a recent United Nations Development Programme report explains: 'Every health center or school that collapses in an earthquake and every road or bridge that is washed away in a flood began as development activities' (UNDP 2004: 9). In a sense, time is reduced to yet another condition to be assessed like location or livelihood rather than treated as a medium that creates its own form of agency (a point I will return to later) in which a disaster unfolds both as an isolated event, as one event among many, and as an event in the context of a particular culture. The key question here seems to me to be the historical relationship between disasters and culture. How has culture affected disasters and disasters influenced culture over time (Bankoff 2003a and 2004)? Culture not only determines how a disaster comes about but even what constitutes a disaster in the first place. (For example, the fact that twelve million people will be injured or killed in traffic accidents in the coming year apparently is not considered as a disaster.) Moreover, what are the processes that respectively 'de-' and 're-disasterize' events: that is how are things that are now considered to be disasters cease to be one and how are ones that are not become one? These types of questions can only be understood by consideration of what constitutes 'time' or the 'past'. Of course, it is a matter of degrees but social science research tends to ignore the importance of the past in general, analyzing temporal spans of limited duration and underestimating how time provides the context not only over which a process unfolds but also the specifics of how it is generated in the first place.

Disasters and the Historian

Just as global conflagration prompted social scientists' interest in disasters following the saturation bombing of World War II, so the growing awareness of global warming has provided a spur to historians interested in the histori-

cal reconstruction of climate and the history of disasters. In the 1990s, the US government began to fund climate-related research in earnest, increasing budgets in this respect to the National Aeronautics and Space Administration, the National Science Foundation and the National Oceanic and Atmospheric Administration among others. These sums were not purely for the study of climate anomalies but were equally to do with their consequences on human behavior and livelihood (McIntosh et al. 2000: 8). The historical reconstruction of climate, of course, has a much longer pedigree, stretching back, in a sense, to the works of Ellen Semple (*Influences of Geographic Environment*, 1911) and Ellsworth Huntington (*Civilization and Climate*, 1915)—though neither of these are strictly speaking works of historiography but of anthrogeography—and including the much more recent studies in climatic history of Hubert Horace Lamb (1977).

Interest in the history of extreme events and their consequences is also a feature dating back to at least late Victorian scholarship, though these types of studies tended to be more mere compilations of past events with some descriptions of their intensity and destructive effects. Thus Cornelius Walford's *The Famines of the World* (1878) provides lists of floods, frosts, droughts, cyclones and earthquakes among other such phenomena dating back to the Deluge (noted to be 'B.C. Date not fixed'), Ivan Tannehill's *Hurricanes Their Nature and History* (1956) furnishes much the same type of information for storms in the Caribbean commencing with the one encountered by Christopher Columbus on 12 February 1493 and David Ludhum's *Early American Winters* (1966) which commences with the severe winter experienced by Pierre du Guast's expedition on St Croix island on the US/Canadian border in 1604-05. Since the 1990s, however, a growing concern with the Little Ice Age and the 'discovery' of the El Niño Southern Oscillation (ENSO) syndrome has led to a proliferation of large-scale research projects on irregular meteorological occurrences such as the Archival Climate History Survey (ARCHISS) and CLIWOC, the Climatological Database for the World's Oceans. There has also been a proliferation of climate-inspired studies by authors such as Christian Pfister for Europe and Richard Grove for the Asia Pacific.⁷ While the focus of these projects is still largely data collection not dissimilar in nature (though different in scope and reliability) to the earlier works of Walford, Tannehill and Ludhum, the emphasis of these more recent works is more on climatic variability and crises.⁸ Again, however, I would argue that the early focus of this approach on chronological data sets, in keeping with the intent of the historian's purpose, has led to an event-focused interpretation of disasters that pays inadequate attention to the non-physical elements involved in the construction of a disaster.

The historian's preoccupation with an 'event-focus' is not to imply that modern works of historiography are necessarily theoretically deficient or conceptually unsophisticated. Though many historians' treatment is largely descriptive, evident for example in the large body of excellent, if somewhat limited studies of floods in Germany and the Czech Republic,⁹ others are more concerned with the possible effect such phenomena might have on the wider society. Even in the latter case, though, there is a common emphasis on disaster as a 'trigger' or 'key moment' in determining or changing the course of human history. While civilization-wide cataclysms that alone bring about the downfall of societies have now been largely dismissed, nevertheless the emphasis is still mainly on comparing the number of severe shocks that one society receives over another. Thus Eric Jones, one of the few historians to directly confront the longer term effect of disasters in historical terms, concludes that the economic advancement of Europe over that of Asia in more recent centuries is largely due to a greater number of disasters in one and to the greater capital accumulation in the other (Jones 1987: 22-41). It is a bit like totting up the score to see who comes off worst. I realize that this is being unjust to the totality of Jones's scholarship and the sophistication of what he terms 'disaster economics' but according to him it is ultimately that 'Europe's overall losses seem markedly less serious than those of Asia' (1987: 38). Disasters are simply reduced to a question of statistics.¹⁰

As to the argument that perceives disaster as a trigger or key moment in history, the notion is that human behavior is determined by the recurrence of 'freak' events, particularly those that threaten or adversely affect livelihood. These events can be physical in nature, such as the relative flood level of the Nile that sets the size of the harvest (Hassan 2000: 132), or socio-economic, such as the periodic crash of the credit system upon which long-distant trade depends (McNeil 1992: 137).¹¹ These stimuli create critical moments when irreversible change occurs, such as when repeated drought necessitates the consumption of the seed put aside for the following year's sowing. Such occurrences are likely to lead to a breakdown in the social order, civil strife, disobedience, and the emergence of new religious or cult movements. Here disaster is conceived of as a temporally framed moment in time that initiates change usually on a widespread or even societal scale. History, as far as it is affected by disasters, is reduced to an episodic series of non-sequential critical moments largely unrelated to each other or to other forces at work in society. Perhaps, as Ken Mitchell argues, the history of disasters receives so little attention because the evidence of catastrophes is rapidly removed from the landscape, precipitating a form of 'collective amnesia' (Mitchell 1999). On the other hand, it is equally plausible that humans have become so inured to its manifestation (deforestation, salinity, degraded soils and pollution) that

people have simply lost the ability to discern its visible forms except in the more extreme cases.

This interest in disasters as critical events, however, has perhaps prepared historians to be more attuned to the psychological effects of hazards and to the close relationship between them and religion. The concern with 'culture' is one of the great strengths of the historian's approach. As long ago as 1958, William Langer urged his fellow members of the American Historical Association to deepen their historical understanding through exploring the concepts and findings of modern psychology, especially in relation to the effects of epidemics on societies and the weather on human affairs (Langer 1958). Michael Barkun developed this idea further, evolving a typology to explain the changes in how unmanageable collective stress is perceived and felt by those who undergo it. What he terms the symbolic element has a history of its own as a disaster is really only an event that an individual so categorizes, irrespective of its causation or the level of damage it causes (Barkun 1977: 219). He identifies three 'modalities' to describe these changes that he proceeds to associate (not mutually exclusively) with certain historical periods: *homeostatic disasters* or natural catastrophes that reflect the rhythms and limits of nature and assume a return to equilibrium prior to about 1750; *metastatic disasters* or artificial catastrophes caused by human behavior whose scale makes a return to equilibrium problematic associated with the upheavals of the Industrial Revolution; and *hyperstatic disasters* or artificial disasters of such intensity that they completely obliterate discernible spatial or temporal boundaries through their global extension and system-destroying properties that he views as commencing with World War I.¹²

Here is one of the few contexts in which 'vulnerability' is used as a measure to determine how a society's experience of disaster changes both in physical as well as perceptual terms. Barkun notes how the modal forms of disasters have increasingly come to be seen as artificial: how storm, plague and earthquake have been replaced by total war, nuclear destruction and ecological disruption as the principal conceptualization of disaster. Yet this perceptual vulnerability differs markedly from the actual state of the built-environment that has become increasingly more vulnerable precisely because natural hazards no longer signify the notion of ultimate destructive forces that they used to (Barkun 1977: 222). Barkun's periodization and perhaps his 'symbolic' history are too rooted in time (the Cold War) and place (the Western World) to have universal applicability, especially as natural forces in the form of global warming and rising sea levels are once again vying with terrorism and WMD (Weapons of Mass Destruction) as the principal representations of disaster. However, the historian's interest in perception and culture remains an important contribution to the understanding of vulnera-

bility and one that is reflected in many modern studies (Johns 1999 and Jankovic 2000).

What remains largely missing in these discussions of disasters, however, is the idea that they are processes as well as events. The ‘effect’ element is present, the notion that disasters are catalysts of change in society that affect urban zoning, landholding, trading networks and even shifts in political power (Massard-Guilbaud 2002: 38-40). But the general lack of conceptualizing historical processes that expose societies to hazards provides no way of linking such events to a wider explanation of why certain people may be situated in more perilous settings than others. By drawing attention to the processes that put these people at risk in the first place, vulnerability provides a ‘natural’ indicator that something may not be ‘quite right’ and that the tensions between a society and its environment may be more than the latter’s ability to absorb. The emphasis that vulnerability analysis places on process underscores the need to understand the increasingly complex inter-relationships between a society and its changing environment over time. In the end, societies in which a higher percentage of people are more resilient and less vulnerable to the onslaught of disasters display a more mature relationship between human and physical forces than those that simply build bigger or dig deeper (Bankoff 2003b).

Time is of the Essence

So far in this paper, I have hardly mentioned the works of Anthony Oliver-Smith. This is not due to any sense of oversight but rather because his conceptualization of disasters comes closest to my own notion of them as both historical processes and sequential events. Moreover, he is one of the few scholars to directly address the question of time in relation to disasters, not simply as an implied dimension in which processes occur nor as marking the period in which such events take place, but rather as a primary unit of analysis—akin to the social, economic or political—that act to both augment and diminish risk. He refers to this approach as an ecological perspective, one that focuses on the effectiveness of societal adaptation to its total environment. Culture and social organization are affected by people’s experience of their environment but equally that environment is deeply shaped by the histories of those societies. Oliver-Smith talks about the ‘mutuality’ that exists between nature and culture and how disasters are uniquely situated in both the material and social worlds as well as in some hybrid space created by their intersection. Any understanding of disaster must be grounded in a theoretical approach that is “capable of encompassing the web of relations that link society (the organization and relations among individual groups), environment (the network of linkages with the physical world in which people and groups

are both constituting and constituted), and culture (the values, norms, beliefs, attitudes, knowledge that pertain to the organization and those relations)” (Oliver-Smith 1998: 186). Moreover, this hybridity also creates a sense of historical complexity that is decisive to the ways in which disasters occur. As the modern world becomes an increasingly complex one, a more holistic appreciation of the inter-relational aspects between environment and society over time is required to adequately meet the challenges posed by the processes of globalization (Oliver-Smith 2004). It is this mutualism that lies at an understanding of vulnerability and its application in revealing both the multi-faceted nature of disaster and its historical roots and political agenda.

To Oliver-Smith, the question of time is a crucial aspect in any consideration of vulnerability. Borrowing the notion of a ‘life history methodology’, he suggests that disasters begin prior to the appearance of a specific event-focused agent and form part of the profile of any human system at its first organizational moment in a relatively fixed location (Kreps 1995). As both an event and a process, it is people’s adaptation (or maladaptation) to their total environment that determines their vulnerability. He refers to the cyclical events of daily life as social processes that are part of a society’s adaptation to its ‘total’ environment, one that is constructed as well as natural, and in which hazards, so to speak, are already ‘embedded’. Change is a result of both the events and processes of history and how people respond to them within the parameters set by their perceptual frameworks which are, in turn, a function of their pasts (Oliver-Smith 1986: 16). In the case of the area affected by the May 1970 earthquake in Peru, the accentuated vulnerability of the region was as much a product of its historical underdevelopment, traceable back to the socio-economic and political consequences of the Spanish conquest, as it was of the event itself (Oliver-Smith 1998: 188, 192).

In a sense, I would argue that there is a temporally-produced state of vulnerability though Oliver-Smith probably would not go so far as to call it that. In other words, history also generates its own form of vulnerability that in a real sense underlies all other forms of vulnerability though its recognition as a factor is always more implicit than explicit. First, of course, there is the particular sequence of events that situate people in time and place; then there are the historical processes that determine their condition and their capacity to withstand its effects. But individuals also ‘construct’ disasters as both a function of their prior experience of hazards as well as from their particular ‘class’ or social group’s perception of what is happening around them (Hilhorst 2004). Moreover, disasters are not so much objective events as subjective ones that can be privileged or erased according to a sense of selective memory or collective amnesia. Only when the study of a hazardous event is linked to its specific perceptual, social and cultural historical context can it really reveal the

processes at work in creating a disaster. Thus, in a real sense, time itself is as much a factor that needs consideration in how disasters are created as are politics, society, the economy, culture and the environment. Few historians, however, have approached disasters from this perspective. Though not focused on disasters per se but on the effects of gradual climate change on agriculture, the French tradition of the *longue-durée* studies combine some of the elements of both event and process (Braudel 1949). More recently, the Network for Social Studies in Prevention of Disasters in Latin America (known as LARED) has also emphasized the historical perspective in understanding contemporary hazard situations (García-Acosta 2002). However, as yet, there is no systematic or sustained historical interest in disasters as both an event and a process.

So where does all this leave us and why am I arguing that time should be regarded as such an important factor in the consideration of vulnerability? As societies become increasingly more complex, there is a 'tight-coupling' between what appear as unrelated events (Perrow 1984). The cause of disasters may progressively lie more in processes that occur at greater physical distance from the areas worst affected and where local populations have increasingly less control over what happens to their communities (Holling 1994). The lineal trajectory of cause and effect, therefore, becomes both temporally disrupted and physically dislocated. How, for example, does one really explain global warming, rising sea levels or heavy metal pollution in fish-stocks at the local level? Under such conditions, cause can no longer simply be derived from discerning the consequence. Instead what is needed is an overview of a multitude of historical sub-plots to discern what links there may be to the generation of disasters. Even the definition of what constitutes a disaster is ultimately time dependent. The parameters of what is regarded as 'normal' and therefore what is considered as 'abnormal' are fixed by the range of instruments, basically little more than 200 years in Western societies and usually fifty to 100 in most non-western ones. Such short time spans constitute the working scale whereby disasters are largely recognized and acceptable levels of risk set. Yet clearly the frequency and intensity of such natural phenomena are not determined by any standards based on purely human statistical records. The historical record, both archival and archaeological, contain much wider data sets from which to assess the nature of such events if properly considered, especially with regard to mode shifts or sudden changes that may provoke equally rapid cultural and societal responses. There is also the nature of entropy to consider, both in the past and perhaps increasingly so in the future. The maintenance of infrastructure as societies have progressively favored technological solutions to the problems they confront engendered by their own scale and complexity constitutes another major source of vulnerability that is particular time dimensional. Such systems, regardless of whether they may be the irri-

gation channels of Angkor Wat or the sewers of modern London, are often more costly and labor intensive to upkeep and refurbish than they are to originally build. Up to now, the principal solution has been to apply more technology in an attempt to further increase the service life of such structures but over time these systems must ultimately collapse—just as they have done in the past.

And, in the end, what is more important to influencing human behavior in disaster situations: what actually happened or what is remembered to have taken place? Social memory, the historical science par excellence, transcends inter-generational instruction of first-hand remembered disaster ‘facts’. As Robert McIntosh et al. argue, it provides a calculus for many of the key transformations of history and of recasting the core ideas from a deeper past so that they can be used to respond to the new circumstances of the moment (McIntosh et al 2000: 25). However, as Ken Mitchell points out, social memory itself is a differentiating concept that varies according to type of event, making it difficult to collapse the aggregate perceived experience of flood, storm, fire, drought and blizzard into a single integrated story. Nonetheless, the availability of different stories is functional for a society that is comprised of multiple contending interest groups who possess different amounts of knowledge and different capacities to intervene in different phenomena. That is to say, time acts differentially upon the social memories of different types of events (Mitchell 2004).

In all these considerations, I think it is apparent that time is an important factor in how disasters are constructed, normalized and remembered. But I am also arguing that there is a temporally-produced sense of vulnerability that is manifest in a community’s past experience of disasters, why it is exposed to hazard, how it responds to them, and what it selectively remembers or forgets about them. On the one hand, this is both process and event but writ much larger than the time-scale usually measured in risk assessment or disaster management. On the other hand, it is also about how time generates its own forms of vulnerability in both influencing how a hazard is selectively remembered and in determining what is perceived to be a disaster. Social memory may be a very intangible factor to measure but it may also be crucial in influencing how people ultimately behave in disaster situations. How history renders a community vulnerable is not simply a matter of understanding hazard as an event but also of considering it as a process that constructs its own perception of disaster. In all this, however, time is very much of the essence.

Notes

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2. John Aberth, *From the Brink of the Apocalypse: Confronting Famine, War, Plague and Death in the Later Middle Ages* (2001) and Andrew Cunningham and Ole Peter Grell, *The Four Horsemen of the Apocalypse: Religion, War, Famine and Death in Reformation Europe* (2001).

3. Some studies of disasters, of course, predate 1945 most notably S. Prince's study of the massive explosion that rocked Halifax docks (Nova Scotia) on the morning 6 December 1917 (1920) and G. White's work on floods (1942), but World War Two and the subsequent nuclear arms race led to more interest in the subject and acted as a spur to more concerted research.

4. It also became a major preoccupation of military analysts during the Vietnam War, 1965-1973.

5. Ken Mitchell identifies three sets of roots to social science research on extreme events: disaster researchers who point to the bombing surveys of World War 2, hazard researchers whose work dates from the flood assessments carried out by Gilbert White and his co-workers from the late 1930s to the 1960s, and risk analysts who trace their origins to the studies pioneered during the Manhattan Project. He concludes that these plural origins provide a convoluted context for interpreting the evolution of the field (Mitchell 1990: 131-178).

6. See particularly in this respect, Fred Charles Iklé's *The Social Impact of Bomb Destruction* (1958).

7. ARCHISS was initiated in 1988 to search for climate and hydrological data held in national archives and involved the WMO, the International Council on Archives, the International Council on Scientific Unions and UNESCO. The aim of CLIWOC was to compose the world's first daily climatic database for the period 1750-1850 based on the meteorological data to be found in different European countries ship's logbooks and involved the Universidad Complutense de Madrid, the University of Sunderland, the University of East Anglia, the Royal Netherlands Meteorological Institute, the National Maritime Museum, Netherlands Institute for Scientific Information Services and the US National Oceanic and Atmospheric Administration.

8. In particular, see Christian Pfister et al. *The Silent Countdown: Essays in European Environmental History* (1990) and *Climatic Variability in Sixteenth-Century Europe and Its Social Dimensions* (1999) and Richard Grove *Ecology, Climate and Empire* (1997) and *El Niño, History and Crisis* (2000).

9. See, for example, the works of Rudolf Brázdil and Jan Munzar.

10. In all fairness, Jones is trained as an economist and not as an historian.

11. William H. McNeil's treatment of epidemics is rather exceptional in

this respect with diseases being linked to a much wider set of factors and consequences (see McNeil 1976 and more recently Curtin 1989 and Wills 1996).

12. Barkun does not claim that any modality enjoyed monopoly status or that that it disappeared abruptly at a fixed point in time.

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