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Chapter 6

TIME AND POPULATION VULNERABILITY TO NATURAL HAZARDS: THE PRE-KATRINA PRIMACY OF EXPERIENCE

Daniel H. de Vries

THE OBJECTIVE GAZE OF THE NEW ENVIRONMENTAL PARADIGM

In their 1978 paper outlining their critique on the culturally dominant Human Exceptionalist Paradigm (HEP), Catton and Dunlap pointed out that “most Americans (until recently) ardently believed that the present was better than the past and the future would improve up on the present” (Catton & Dunlap 1978:43) and argued that sociologists analyzing human societies easily followed this same technologically optimistic worldview. Central to Catton & Dunlap’s critique was the commonly held assumption that human cultural evolution would outpace biological change, and cultural adaptivity and associated technological innovations would be able to continue progress without limit, “making all social problems ultimately soluble.” A tantalizing proposition for sociologists, as this superiority of human innovation elevated humans above nature in a society where there are no known limits to improvements of technology and organization, the relationship between a growing population and its earthly habitat could be sustained.

Catton & Dunlap’s impetus for an environmental sociology came as critique on this shared anthropocentrism that was historically based on two mainstream currents of thoughts in sociology. First, the Durkheimian tradition argued that social facts can only be explained by linking them to other social facts, in an effort to claim space for the social sciences to be equally disciplinary and authoritative as the natural sciences, requiring its own set of dynamic understandings. A second (Weberian) stream of thought emphasized that the ways in which people define their situations to explain their actions was primarily explainable by surrounding actors and not by the situation’s

physical characteristics. Emphasizing the actor's definition, the "environment" came to be relevant only relative to how it was perceived and defined in this "constructivist" approach. Physical conditions never themselves produce awareness of an environmental problem, but this is always socially attributed through human interpretative framework (Douglas and Wildavsky 1983).

The *New Environmental Paradigm* (NEP) challenged these sociological currents. Humans were placed back into nature and the limits of ecological resources were acknowledged to influence human societies with a vengeance, as "intricate linkages of cause and effect and feedback in the web of nature produce many unintended consequences from purposive human action" (Catton & Dunlap, 1978:45). The alternative which Catton & Dunlap brought to sociology was a liberation of the anthropocentric perspective through an admittance of the relevance of dynamics at other levels—the physical, biological, neurological— to explain social facts in their own right. In defense of the HEP, critics stressed that the NEP missed the main point of environmental sociological analysis, which was to explain which social processes and mechanisms cause something to appear as an environmental problem (Lidskog 1998). Further, critics pointed out that the assumption made by Catton and Dunlap that somehow "objective" environmental problems forced themselves into public consciousness, thereby promoting a realist, almost environmental deterministic, position and ignoring the social mediation proposed by constructivists was untenable. As sociology grappled with the constructivist versus realist debate, Dunlap and Marshall (2007) eventually concluded that both constructivist-relativist and realist proponents could find common ground in "critical realist" or "contextual constructivist" positions.

But while common ground was found, this also illustrated the limits of the New Environmental Paradigm proposed. While the NEP repositioned the position of humanity from above nature (anthropocentric) into nature (ecocentric), it did not reorient environmental sociology's methodological emphasis from an objectified, anthropocentric gaze favoring positivist, human observer's interpretation of a modeled (reductionist) reality into an ethnographic perspective in which

ecocentric vision and evaluation is embedded in the landscape, the people therein, and the flow of events. What the NEP did not do is move sociology closer to its ethnomethodological (under)current, which postulates that interpretation and significance can only be obtained by immersion and embeddedness *inside* the environment of study. In cultural anthropology, Rappaport distinguished this cultural model as “the model of the environment conceived by the people who act in it” from the more objective, scientific quantifiable depiction of the “physical world”—the operational model—adhered to in environmental sociology (Rappaport 1968; Biersack 1999). This difference originally was referred to as “emic” versus “etic.” In an emic approach local knowledge and ethno-semantic taxonomies are central. In etic approaches, objective and scientifically “true” representations of an objective reality are expressed, represented by measures of perceived reality in quantitative models. While the NEP broke up the conversation about the relationship of humans in nature, the inclusion of ecological relationships in sociology remained controlled by this objectivist, etic gaze, wherein a sociological reality interprets a pre-given biophysical reality. The argument made in this chapter is that this paradigmatic emphasis on objective seeing core to the empirical sciences limits the applicability of the NEP. In particular when it comes to temporality, the etic emphasis on time as chronological disfavors emic relationships to biophysical reality common to a true ecological vision. The question surfaces if, temporally speaking, environmental sociology ever left the Human Exceptionalist Paradigm. Unable to emerge within environmental sociology, it is argued that this compromised vision limits understanding of the complete temporal experience that explains risk behavior and underlies population vulnerability to natural and man-made disasters. It is argued that this missed opportunity of using the New Environmental Paradigm to reclaim an ecological, emic phenomenological perspective in sociology can literally have disastrous consequences, because environmental sociology tends to miss a crucial dimension of system vulnerability to hazards and disturbances which emerges from the human embeddedness inside complex, *temporal* ecological relationships, or the position that humans are *in* time.

DISASTER AND CHRONOLOGICAL TEMPORALITY

Vulnerability to hazard events is the potential for loss (Cutter 1996), the degree to which a system or subsystem is likely to experience harm due to exposure to a hazard, either as a perturbation or stressor (Turner *et al.* 2003), or the inverse of the local capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard, or resilience (Blaikie *et al.* 1994). Socially vulnerable populations are typically seen as those who live in a marginalized state of permanent emergency as a result of negative power relationships (Wisner 1993). From a sociological point of view, this swiftly leads to the integration of census and survey variables, such as poverty, into vulnerability indices for specific administrative geographies in an effort to estimate a population's proneness to loss when faced with a hazard at a certain point in time. To account for the temporal in this exercise, more time periods are added through standardized (measurable) time-intervals, creating historical patterns of changing levels of vulnerability "through time", complemented with historical descriptions of the causes for these dynamics. In this view of temporality, time remains seen as from the outside, in an objective, *etic* view. This way of understanding time is firmly rooted in the Human Exemptionalist Paradigm. Western, rationalist or Cartesian tradition of thought has long promoted a de-situated understanding of people and things relying on the merits of detachment; a mode of being which allows a distanced view that enables us to obtain a wider view because we extract ourselves from the immediate pressures and passions of the moment (Spinoza *et al.* 1997). The disciplinary approach to the study of social movements through time follows this detached perspective as it privileges an absolute, true and mathematical time, which of itself, and from its own nature, flows equably without regard to anything external. Sociology's objective gaze presupposes and is built upon this notion of external, linear time as it allows for standardization of time intervals needed to measure speeds of change. How else can a social movement, such as environmentalism, be objectively traced "through" time? Statistical and spatial modeling and simulations use chronological time-series to predict future systemic scenarios and states. In this sociological reality, change is predicated on the standardization of time in measurable order, allowing for movements of "levels" of environmentalist attitudes to be traced.

The modernist view on temporality still provides the major philosophical grounding for most of the definitions of temporality that underlie environmental sociological analysis, including studies of social vulnerability to disasters. Since the Western, commonsensical way of thinking depends on non-historical detachment (or non-historical improvisation in the post-modernist case), researchers and theorists dealing with temporality in disaster research are ill prepared to describe or even notice how “history making” is embedded in practices, activities, and the skills of people themselves. The field as a whole tends to undervalue the contribution which the situatedness of a floodplain population *in* time makes to its vulnerability (or resiliency). This is serious error with a long history that is seemingly taken for granted and follows the temporal assumption central to the Human Exceptionalist Paradigm that humans have control over nature. As Catton & Dunlap’s proposal was largely focused on empirically detecting, measuring, and monitoring a new, sociologically shared public attitude, namely that of environmentalism, the NEP critique did not problematize the sociological paradigm of objective time inherent to empiricism.

SOCIAL TIME

In the early 20th century, philosophical critique gave rise to a sociology of time in which the concept of “social time” came to be emphasized (Heidegger 1927; Durkheim 1915; Elias 1991). The opening up of the time concept allowed a plethora of notions of time to be identified (Ma 2000). Time shrinks when it passes, and as such eventually disappears, ceases to take place (Derrida 1995). Time is a fluid, a space, a sheet or field that percolates (from “passoir” or “sieve”) and as such passes and does not pass (Serres & Latour 1995). A task or event-orientated time is shaped by the onset, duration, and completion of daily, weekly or seasonal tasks. For example, for the nomadic Nuer in Ethiopia “the daily timepiece is the cattle clock, the round of pastoral tasks, and the time of day and the passage of time through a day are to Nuer primarily the succession of these tasks and their relation to one another” (Evans-Pritchard 1940). Body time is an organic form of time which “squirms and wiggles like a bluefish in a bay, making its mind as it goes along” (Couclelis 1998). What all these ways of understanding time have in common is the way in which time is not seen as an external, “natural”

category out there, independent of social life, but instead intrinsically connected to the rhythms of the social. Or, that temporality has been made relative to human ecological experience; the point of view of the observer in their historical ecological system.

In the world of disaster studies, social time was recently introduced by the United States National Resource Council (2006), who called for a complementary treatment of social and chronological time in the **Societal Response to Disasters**.

Social time is argued to be nonlinear and multidirectional and experienced differently by individuals. Three ontological claims are made. First, within social time, the past may be reconstructed from the present. Second, the present may be reconstructed from the past. Third, the future is linked to the present and past in social time. Decisions to build in a floodplain are based on prior disaster experience and future disaster expectations as both relate to assessment of hazard vulnerability.

According to the council, this ties disaster mitigation and preparedness to emergency response and recovery. Chronological time compresses and expands in social time as individuals and social systems create, define, and adapt to environmental hazards, the risks associated with them, and the disasters that occur for them.

Since the temporality which is relevant to those living and dwelling within hazardscapes is not chronological but experiential, it is sensible to identify research approaches which fit within this profoundly social context. Grounded in the everyday existence of populations in their "lifeworld," such a perspective is identified as dealing with social time. Few researchers appear to have identified the emic connection between vulnerability and populations situated in social time. Forrest (1993) uses a social time framework to explore how six communities acknowledged the first and second anniversaries of Hurricane Hugo and as such built a process for collective remembering:

Disaster anniversaries entail an interactive process in which people share personal experiences. Public officials make declarative comments while the press and electronic media reconstruct the disaster experience by recording current thoughts and reflections. In short, the disaster anniversary is a process of collective remembering (Forrest 1993:448).

Bankoff (2004) has taken this collective remembrance a step further, by arguing that historians have systematically seen disasters as non-sequential historical “events” instead of social-historical processes, a position strongly brought forward in anthropology by Hoffman & Oliver Smith (2002). Based on this, he proposes a temporally produced state of vulnerability that underlies other forms of vulnerability, yet remains often implicit as a factor:

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. 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 (Bankoff 2004).

A DWELLING METHODOLOGY

An ecocentric vision suggests that people and the environment are mutually constitutive components of the same world. Phenomenology has motivated such vision by proposing that in both perception and consumption, meaning embodied in environmental objects is drawn into the experience of subjects by being in a world and trying to decipher how this being informs our behavior. This perspective proposes an enactive cognition; it is not the representation of a pre-given world by a pre-given mind, but rather the enactment of a world and a mind on the basis of a history of the variety of actions that a being in the world performs (Ingold 1992). This enactive approach is a radical philosophical critique of the idea that the mind is a mirror of nature (Varela *et al.* 1991). Instead, our life-world exists relative to the extent to which a “world-out-there” is actually appropriated, acted upon, crafted, and transformed, foremost through interactions. Such action in the world is the practitioner’s way of knowing it: the acquisition of environmental knowledge is inseparable from being part of it, engaging with it. This emic perspective as such can be seen as the scientific study of experience (Jackson 1996). Ingold (1993) has called this a “dwelling perspective” in which humans experience the world through

active engagement with their environments. He suggested that the landscape is constituted as an enduring record of, and testimony to, the lives and works of past generations who have dwelt within it, and in so doing have left there something of themselves. From this dwelling perspective, the presumed continuity between mind and world “privileges the understandings that people derive from their lived, everyday involvement in the world” (Ingold 1993:152). In other words, the landscape through which vulnerability develops not only tells, but *is* a story. As Ingold puts it: “to perceive the landscape is therefore to carry out an act of remembrance, and remembering is not so much a matter of calling up an internal image, stored in the mind, as of engaging perceptually with an environment that is itself pregnant with the past” (Ingold 1993:153).

This dwelling perspective was used as foundation for the ethnohistorical case study of Jefferson Parish, located in the New Orleans Metropolitan Area, with the aim of uncovering how past experiences of hazard events had influenced current situational evaluations of risk and potential collective surprise (as a proxy for emergency unpreparedness). The case study was part of larger ethnographic research conducted in U.S. urban floodplain neighborhoods conducted from 2004 – 2008 (De Vries 2007, 2008). Field visits for the Jefferson Parish case study included open-ended formal interviews with key informants, including disaster mitigation officials (n=4) and floodplain residents (n=15), analysis of materials and documents (including a number of videos part of flood prevention education strategies), and informal conversations and observations. Fieldwork was conducted intermittently during the two years before Hurricane Katrina struck the area (2003 & 2004 visits). The research aim was to find out what particular historical series of events would explain current, behavior of the dwelling population. Experiential information about dwelling was obtained by paying attention to how dwellers referenced past events, and how this *temporal referentiality* influenced their expectations into the future, giving attention to surprise events and the timing of their impacts (De Vries 2010). Research analyzed the extent to which the actual historical timing of events—captured in experiential knowledge—mattered to risk behavior, how knowledge about the complex hazardscape of Metropolitan New Orleans dependent on the specifics of that narrative history, the extent to which this history was obscured, and what elements of risk hidden in the landscape remained potent but only

incompletely or indirectly revealed from view. The following case study evaluates to what extent this dwelling perspective differs from the objective gaze of sociological linear time in its approach to vulnerability and how this difference impacts the local capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard, or resilience.

THE SOCIO-HISTORICAL VULNERABILITY OF NEW ORLEANS METROPOLITAN AREA

Just as there is variation in the physical landscape, the landscape of social inequity has increased the division between rich and poor in this country and has led to the increasing social vulnerability of our residents, especially to coastal hazards. Strained race relations and the seeming differential response to the disaster suggest that in planning for future catastrophes, we need to not only look at the natural environment in the development of mitigation programs, but the social environment as well. It is the interaction between nature and society that produces the vulnerability of places (Cutter 2006).

This quote from one of the leading social vulnerability researchers and creator of the Social Vulnerability Index, now widely reproduced in many hazard mitigation and disaster management fields of practice, follows the NEP as it places the social back into nature emphasizing vulnerability is the interaction of both. The underlying Social Vulnerability Index technique, trademarked as SOVI™, illustrates this intention by integrating key metrics of demographic census taking—core instrument of sociological empiricism—to use as vulnerability background to the geographically specific impact of natural (or man-made) hazards (Cutter *et al.* 2003). SOVI™ measures the social vulnerability of U.S. counties to environmental hazards using socioeconomic variables “which the research literature suggests contributes to reduction in a community’s ability to prepare for, respond to, and recover from hazards” (HVRI 2010). For example, in the SOVI™ 2000 social vulnerability map distributed on their website, nine significant components are integrated which explain 76% of the variance in the data: socioeconomic status, elderly and children, rural agriculture, housing density, African American

female-headed households, gender, service industry employment, unemployed Native Americans, and infrastructure employment. As census surveys are conducted every ten years, the social vulnerability technique can be used to show historical patterns. A paper published in the National Academy of Sciences entitled “Temporal and spatial changes in social vulnerability to natural hazards” (Cutter & Finch 2008) illustrates this conception of temporality by showing a chronological succession of maps that are based on the mix of census measures mapped through ten year intervals in the United States from 1960 to the present, shown in Figure 6.1.

[INSERT FIGURE 6.1 HERE]

Based on this exercise it is concluded that components consistently increasing social vulnerability for all time periods were density (urban), race/ethnicity, and socioeconomic status, and that there is a dispersion of spatial patterning of social vulnerability. The authors conclude that based on this historic assessments, future preparedness, response, recovery, and mitigation planning, may need to be more responsive to flexible approaches that nest place-specific local variability within broader federal policy guidelines and frameworks. What this “variability in scale” means is to focus on the historical peculiarities of local U.S. counties, the “geographic consideration” of variability, and to pay attention to the temporal scale of analysis (e.g. the number of years in the analysis), the “temporal consideration”. Figure 6.2 shows an example of geographic specificity in the case of the City of New Orleans, simultaneously illustrating the influence of SOVI™ in FEMA’s HAZUS-MH vulnerability mapping application.

[INSERT FIGURE 6.2 HERE]

The emphasis on mapping keeps this social vulnerability analysis temporally static. Figure 6.3 shows the typical temporal consideration, in this case for a number of counties (Parishes) affected by Hurricane Katrina’s storm surge using SOVI™ data from 1960 through 2000. Doing this, the

conclusion emerges that a remarkable lack of change in social vulnerability for the City can be seen: “In 1960 Orleans Parish ranked in the top three percent of the most socially vulnerable counties nationally, the same percentile ranking it had in 2000” (Cutter *et al.* 2006:11).

[INSERT FIGURE 6.3 HERE]

This differential vulnerability of counties is of course of crucial importance to sociological analysis.

The authors conclude:

What this suggests is that while New Orleans may have seen some incremental improvements in its overall social vulnerability during the past four decades, it is no better off today than it was in 1960. In fact, the dominant indicators of social vulnerability in 1960 in Orleans Parish—race and gender—are the same ones that are driving the production of social vulnerability today (Cutter *et al.* 2006:11).

But does this historical social vulnerability analysis truly represent the temporal in the vulnerability equation? If vulnerability is the potential for loss, the conclusion that New Orleans was equally social vulnerable in 1960 as in 2000 bypasses forty (or more) years of dynamic embeddedness of human decision making moments in cultural and experiential realities calibrating hazard events to stories and narratives, references of flooding to disaster, that may or may not influence how prepared this same “social” actually is in the face of recurrent disaster risk. In the next section I will illustrate this type of vulnerability.

THE TEMPORAL VULNERABILITY OF THE NEW ORLEANS METROPOLITAN AREA

Post-Katrina, social vulnerability analyses pointed at power discrepancies in race, class, and poverty as stated reasons why many residents stayed behind to ride out the storm (Dreier 2006; Burgess 2006; Kellner 2007). Issues related to historical referencing have received much less attention, even though they complicated the evacuation scenario. During the pre-Katrina years, it was publically known that the “Big One” was possible, likely, and impactful. It was also known that the public was generally complacent on this issue. As a result, evacuation behavior was a major emergency management

concern. This is easily illustrated by numerous efforts to have the public understand the reality and necessity of possible evacuation. For example, Jefferson Parish released a public education video in 2003 called “The Cries of a Hurricane,” in which computer simulations were used to try to visualize to the public the meaning of evacuation messages: “For those who have been lulled into false sense of security by false alarms, you are gambling with your lives and those of your family” (The Cries of a Hurricane 2003). The video is dramatic, showing dramatic pictures of the City submerged, as shown in Figures 6.4a and 6.4b.

[INSERT FIGURES 6.4A AND 6.4B HERE]

Another example is a public broadcast program produced by Total Community Action in 2005 called “Preparing for the Big One.” In one of the episodes, the likely possibility of a complete, mandatory evacuation is explained by City of New Orleans Mayor, Mr. Ray Nagin:

I want to remind everyone we live in a bowl. Everything above a category 2 hurricane has real possibility of flooding. Historically, people think that if they go to a school site, they'd safe. Our experts are now telling us that the school sites might not be strong enough, and the superdome is only a shelter of last result. People need to have their own plan (Preparing for the Big One 2005).

In the video, Oliver Thomas, City Council President, mentions that there has been a significant increase in the number of hurricanes and uses the 1964 Hurricane Betsy baseline event to bring the point home:

Both my sets of families have experience. With Betsy being stuck on the roof of a house waiting for people to come rescue us. I experienced it as a child. I understand how important it is. Every family needs to have an idea of what they will do when a hurricane comes this way. ... People are inclined to do what they've always done, or what their parents or grandparents always did. And it is really hard to convince people that things have changed (Preparing for the Big One 2005).

The urgency of the evacuation message is revealed in the notion of change quoted above. During the past generation, Betsy had been the only major hurricane that had flooded part of the City of New

Orleans. Betsy brought a 14 feet storm surge through the Industrial Canal, which breached the levee at the dominantly lower-income, minority district called the “9th Ward”. Just as Katrina, this impact confirms the social vulnerability thesis of class impacts. However, Betsy’s storm surge did not match the 27 feet surge that resulted from Hurricane Katrina in 2006 and the potential impacts which Hurricanes Camille (1969), George (1994) and Ivan (2004) *could* have had had their paths been different. What was not reflected in the cultural Betsy risk baseline, was the impact of the rapid disappearing wetlands on surge heights. Canals dug by oil and gas companies in the mid-sixties broke-up the wetlands and increased saltwater saturation from the Gulf of Mexico, while runoff, subsidence and pollution from exploration and extraction compounded the problem (Hecht 1990; Morton *et al.* 2002; Burley *et al.* 2007, Tidwell 2003). Since the 1940s, every kilometer wetland lost increased storm surge wave height by 1 meter. According to the USGS, coastal Louisiana has lost an average of 34 square miles of primarily marshlands per year from 1932 to 2000, totaling 1,900 square miles (United States Geological Survey 2003). During the 1990s, this Louisiana loss accounted for an estimated 90 percent of the coastal marsh loss in the lower 48 states. During this period of wetland loss, a number of Hurricane missed the City after 1964, which did not weaken or challenge Betsy as the only experiential impact baseline scenario. Instead, the opposite happened. Betsy alarmed the U.S. Army Corps of Engineers to problems of channelization and lead to the South Lake Pontchartrain flood protection authorization by the U.S. Congress. This new levee system was supposed to protect the area from the kind of storm that would come only once in two centuries, or with a recurrence interval of 200-300 years (General Accounting Office 1982). The main tool used to design the levee system was a hypothetical storm referred to as the “Standard Project Hurricane”. However, not until after Katrina did it become clear that calculations for this hypothetical storm did not include the extreme storms of Betsy and Camille (which had by then already occurred), and was instead based on Weather Bureau data on hurricanes which approached the coastal area from 1900 until 1956 (Davis *et al.* 2006). Even later levee reinforcements after 1979 did not use updated Weather Bureau data (Anderson *et al.* 2007:20). What investigative committees concluded was that the Standard Project Hurricane was in fact equivalent to a hurricane with category 2 winds, category 3 storm surge, and category 4 barometric pressure; not nearly as intense as Betsy.

Betsy was also likely strengthened as baseline scenario through another pathway in the dwelling realm: Betsy was the best fitting impact scenario in a reality which brought with it cognitive dissonance as a result of high emotional costs of false evacuation alarms. Many study informants described the evacuations as “horrendous”, “scaring the living hell out of everybody”, and “They took people out of hospitals. It was the most chaotic thing.” An older couple I interviewed called the Ivan evacuation a “20 hour nightmare,” and told me that their neighbor “started to evacuate, but the traffic was so terrible he turned around and stayed.” In their assessment, the Ivan experience made a lot of people less inclined to evacuate the next time, which unfortunately was Katrina. In her testimony to Congress, Governor Blanco of Louisiana presented the chaos which Ivan spurred as “not very pretty” (Babineaux Blanco 2005).

Betsy changed the hazard landscape into a dwelled experience of relatively false security, while the near misses kept Betsy socially active as the baseline reference of “how bad things could get,” despite overwhelmingly changed environmental conditions which would overwhelm Betsy as historical analog. An example comes from one of the informants related to the emergency management division:

Informant: They had George, Hurricane George. For years the theory was to take residents from low-lying area that had never been flooded and put them in superdome and high buildings. Then the Government said these high rise buildings were not safe, and then they got the idea to evacuate the entire city.

Interviewer: When did this shift happen?

Informant: In the 90s. We evacuated with George. It was coming in a week or two. We did not know what to do. We did not want to go on a highway.

Interviewer: George was the one before Ivan.

Informant: It kind of veered off. No problem whatsoever. But at the time it was a class 5 hurricane. Theoretically, it could have come here and wiped New Orleans off the map. If you could see what Betsy did. Furniture on the street. Twenty feet water. Days and weeks with trucks. You can imagine the smell (Personal Communication 2004).

Describing an unnecessary evacuation—as George eventually veered off— pre-Katrina in 2004, this informant both imagined disaster yet returned to Betsy as the cognitive baseline against which to

evaluate and visualize the real impact scenarios of George and Ivan, as he had experienced Betsy as a child. Despite its ill-fitting analogy to current conditions, this miscalibration grew stronger with every missed impact. Not only were those without the lived-experience of a major storm event at risk of complacency, but those with who had experienced Betsy seemed to have taken this event not as a warning, but instead as evidence that the “Big One” could be weathered as well. Particularly the elderly, who stayed at home during Betsy in the past and for whom the decision to evacuate came with substantial additional costs, used this baseline to argue against leaving the area up to Katrina. In “Act I” of his movie “When the Levees Broke,” Director Spike Lee interviews a number of residents who decided to stay during Hurricane Katrina. When reasons for staying put are mentioned in these interviews, one item Lee highlights is the Betsy baseline. For example, Donald Harrison, musician and resident of Broadmoor, tells the film director:

I was here during Hurricane Katrina. Because my mother-in-law decided, as many New Orleanians did, that they could weather the storm. We had not had a major hurricane since 1965. That was Hurricane Betsy. I remember when I was 5-years-old, the water coming up then and driving through it, surviving it. So, I have always been afraid of hurricanes (When the Levees Broke 2006).

Data from evacuation polls confirm this perception. For example, a survey conducted in 1995 by the Louisiana Population Data Center at Louisiana State University collected information on the experiences of respondents living in affected parishes in Southwestern Louisiana when Hurricane Andrew struck in August 1992 (Irwin & Hurlbert 1995). Counter intuitively, it was found that households with hurricane experience were less likely to evacuate (38.7%) than those without hurricane experience (49.6%) (Mei 2002).

In the face of this misguided dwelling-based referencing, dramatic media campaigns voicing disaster were to some extent met with disbelief, as the intention to evacuate increased only marginally over time according to polls done by the University of New Orleans Survey Research Center (Howell *et al.* 2007). Evacuation polls conducted after Hurricanes Andrew (1989), George (1998), a public hypothetical impact exercise scenario (2004), and after Hurricane Karina (2007), suggested that before Katrina struck, evacuation warnings were often unheeded , shown in Table 6.1.

Table 6.1: Hurricane Evacuation Poll Data

Event	Jefferson	New Orleans	Both	Source
<i>1992 Evacuated after Hurricane Andrew</i>			15%	The Times Picayune 1998
<i>1998 Evacuated after Hurricane Georges</i>	45%	27%		Howell et al. 1998
<i>2004 Percent likely to evacuate when recommended. Hypothetical Scenario Poll June 2004 (before Hurricane Ivan)</i>	27% definitely 43% probably	30% definitely 40% probably		Howell et al. 2007
<i>2007 Percent likely to evacuate when recommended.</i>	55% definitely 22% probably	75% definitely 14% probably		Howell et al. 2007

After the 1998 poll, the Times-Picayune reported that the polls offer “sobering statistics,” showing many residents evacuate too late (The Times Picayune 1998). In 2004, this situation was still severe enough for the Times to report that “officials need to do a better job of educating the public about the risk posed by catastrophic storms” (The Times Picayune 2004). Despite the monstrous theoretical impacts George or Ivan could have had, historical experience continued to determined behavior up to that point. As Shirley Laska at the Center for Hazards Assessment, Response and Technology, at the University of New Orleans wrote in November 2004 as a response to Ivan:

Recent evacuation surveys show that two thirds of non-evacuees with the means to evacuate chose not to leave because they felt safe in their homes. Other non-evacuees with means relied on cultural traditions of not leaving or were discouraged by negative experiences with past evacuations (Laska 2004).

After the 2004 evacuation polling, University of New Orleans researchers concluded that people believed that their homes were safe being protected by levees or situated on high ground. This exactly is what Howell et al reported in 2005 as a result of a study in which they compared willingness to evacuate across southern Louisiana (Howell *et al.* 2005). The most remarkable finding in this study was the low perception of risk felt by most residents in southeast Louisiana:

In nine of the twelve parishes, 60% or more of the respondents said they felt safe in their homes if a Category 3 hurricane came near. Far fewer residents believe they would be safe in a Category 4 storm, indicating that the difference between Category 3 and Category 4 is the border at which most people believe they are at risk (Table 1). However, based on predictions about flooding from federal agencies, disaster officials in all of these parishes consider nearly everyone in the areas surveyed to be at risk in their home in a Category 3 hurricane (Howell *et al.* 2005:3).

Even more interesting is how the study emphasized two particular factors as to why people felt safe in their homes during a Category 3 hurricane. The first of these included beliefs about the strength or location of their house, and the second was their *past experiences*. The results suggest that having lived in south Louisiana more than thirty years, and having never lived in a home damaged by a hurricane significantly *decreased* residents likelihood of evacuation. As the researchers wrote:

People naturally rely on their past experiences to assess how safe they are. Many residents of southeast Louisiana have lived here all of their lives and never experienced hurricane damage to their home. In fact, an average of 40% of residents in these parishes have both lived in southern Louisiana more than thirty years *and* have never had hurricane damage to their home. It is difficult for some of these longtime residents to realize that the environment is much different today, and that past experiences are probably not relevant (Howell *et al.* 2005:3).

The data from Table 6.2 below illustrate these findings.

Table 6.2: Percentage evacuating in last recommended evacuation by type of people who evacuated (Adopted from Howell et al. 2005)

Parish	Having Lived in a Damaged Home	Never Having Lived in a Damaged Home	Living in Southern Louisiana	Living in Southern Louisiana <u>more than 30 Years</u>
Assumption	46	31	59	31
Jefferson	50	52	60	47
Lafourche	40	24	34	30
Orleans	44	42	47	40
Plaquemines	58	54	67	51
St. Bernard	55	43	43	51
St. James (half)	30	19	29	20
So. St. Tammany	15	14	13	16
Terrebonne (south)	53	30	51	40
St. Charles	74	70	80	68
St. James (half)	30	33	36	31

St. John	52	39	45	41
So. Tangipahoa	20	17	26	15
Overall	44	36	45	37

The authors note that in six of the twelve parishes, *people who have lived in a home damaged by a hurricane* are more likely to heed the official recommendation to evacuate. They are more likely to feel they are at risk. In six of the twelve parishes, *people who have lived in southern Louisiana more than thirty years* are less likely to evacuate¹. The authors argue that long-term residents have lived through many hurricane threats and since most of those hurricanes have not directly hit southern Louisiana, these residents are less likely to feel that they should leave their homes. An average of 74% of the residents in these six parishes have lived in southern Louisiana more than thirty years. In no parish were long-term residents significantly more likely to evacuate:

In some ways southern Louisiana is now a victim of its past good luck; most residents have not experienced damage, and lack of prior hurricane experience promotes a feeling of safety and thus resistance to evacuation (Howell *et al.* 2005).

What these messages address is a false sense of security that is rooted in historical experience, in dwelling. A perception which came to be fatal to anyone who did not take the early warnings seriously and stayed in the City based on their knowledge of the past. In a National Geographic video on Katrina, Dr. Walter Maestri, Jefferson Parish Emergency Management Director, summarizes how this sentiment is directly linked to experiential knowledge of historical ecology:

They will tell you ‘oh we have been here through Betsy, or Camille, or any of the other hurricanes. There have been all kinds of hurricanes which have come through here, none of them could truly devastate the area’ (National Geographic Video 2005).

CONCLUSION

Contrasting the two narratives on temporality, quite different stories emerge which both depict a vulnerability that has temporal dimensions, but arrive at different conclusions. Looking at the period

¹ Parishes are Assumption, Jefferson, Plaquemines, St. Charles, Terrebonne, and Tangipahoa.

from 1960 through 2000, the historical Social Vulnerability Index approach shows that vulnerability in the metropolitan area of New Orleans remained equal over time, despite the decrease in social vulnerability of surrounding counties and at national level. The narrative as such points at a social criticism of underlying reasons why the impact of the Katrina event might have been exacerbated by pre-existing socio-demographic trends, in particular the discriminatory impacts of race and gender. While of significance to disaster mitigation and prevention, this vulnerability analysis does not reflect the vulnerability that emerged as a result of the temporal situatedness of the local population relative to previous hazard events. This *temporal vulnerability* emerged as a result of floodplain dwelling and risk behaviors which were relative to inhabitation, learning, cultural and institutional memory, and the stochastic timing of previous events. Hurricane Betsy, a much smaller impact event than Katrina became the reference baseline, while misguided levee protections and Hurricane misses made the City, temporally speaking, more vulnerable each time evacuation was in vain and the actual reality of a real impact came to be transformed into visions of wasted time in chaotic traffic jams. What an analysis of this type of vulnerability shows, is that temporal vulnerability increases the more distant the experiential impact of the last hurricane is, in particular for residents who had not experienced Betsy and only relied on stories and narratives of others. While Katrina was temporally so close, those dwelling in the floodplain experienced its likelihood as somehow removed and normalized as irrelevant. What it also showed was that in the practice of emergency management, concern about the impact of this emergency complacency among the general public was real and growing. Public outreach videos and mayoral speeches were needed to rectify this situation. At the same time, narratives surrounding evacuation behavior remained focused on analyzing social-demographic indicators in the city: inequality, race, and transportation logistics. The growing impact of the temporal distance to the last, (barely) comparable event, Hurricane Betsy, or the length of time a resident had lived in the area, did not translate into emic analyses of vulnerability.

In an effort to account for the proposed temporal vulnerability, more attention should be placed on the mutually constitutive lived-reality of dwelling in population-environment dynamics. The stochastic timing of hazard events, the not-needed evacuations, the relative distance in time to previous historical

analogs, landscape levee protections providing a false sense of security, and the quality of referential memories thereof combine to influence dwelling behavior and may as such imply a dimension of vulnerability that is uniquely temporal. For floodplain dwellers, decisions, evaluations, and evacuation plans are not based on forward looking rational projections, but on backward looking referential chains of temporality connecting the timing and occurrence of past events to cultural models of the environment in the present. This co-evolution of the hazard disturbance regime and the experiences and contaminant behaviors of those dwelling inside it is inherently obscure and difficult to measure, as it is entirely dependent on local, cultural variabilities related to social time. Yet, this temporality within the dwelling perspective may produce its own form of vulnerability if not well maintained. When the quality of temporal referencing back to past events is compromised, complacency sets in, and the ability of a population to recover from disturbance is reduced as emergency preparedness is lowered and the potential for collective surprise is enhanced. This surprise, however predictable, is real, human, and anthropological. Without emic knowledge about this systemic, dwelling history, sociological knowledge about vulnerability and change remains limited.

What this case study illustrates is that the dominance of objective time can arguably be seen as one of the final frontiers of the paradigm of environmental control, which underlies the Dominant Social Paradigm. While the New Environmental Paradigm imposed a new conceptualization between culture relative to nature, one which pointed at the ecological equality and interrelationship of both, this has not changed the disciplinary foundation of separating nature and culture through the imposition of an objectified temporality. Environmental sociology as such remains stuck in an anthropocentric environmental paradigm to the extent that it envisions temporality as abstract, linear time, to be mastered by imposing the objectified gaze.

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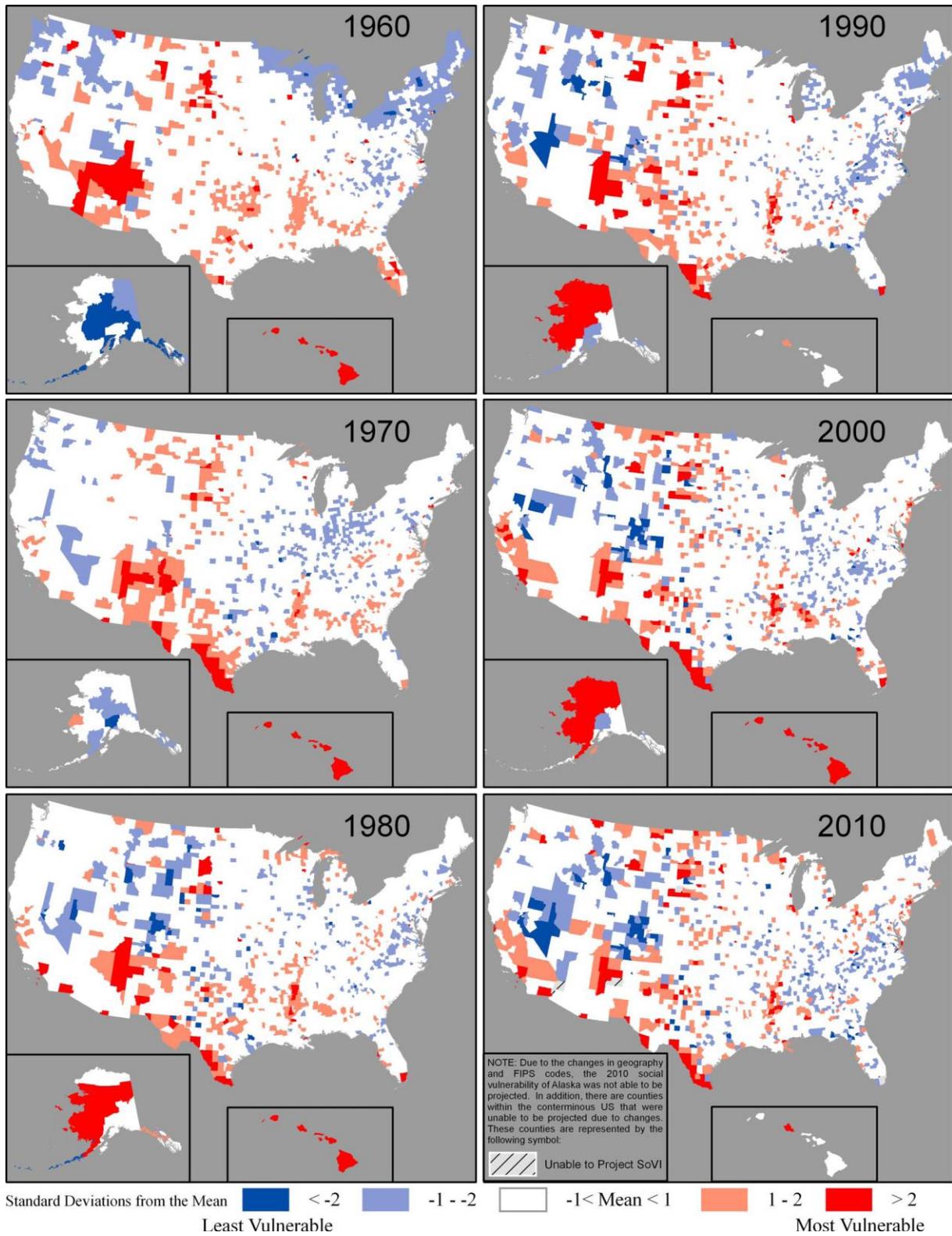


Figure 6.1: Social vulnerability 1960–2010 based on SOVI™ (Cutter & Finch 2008), Copyright

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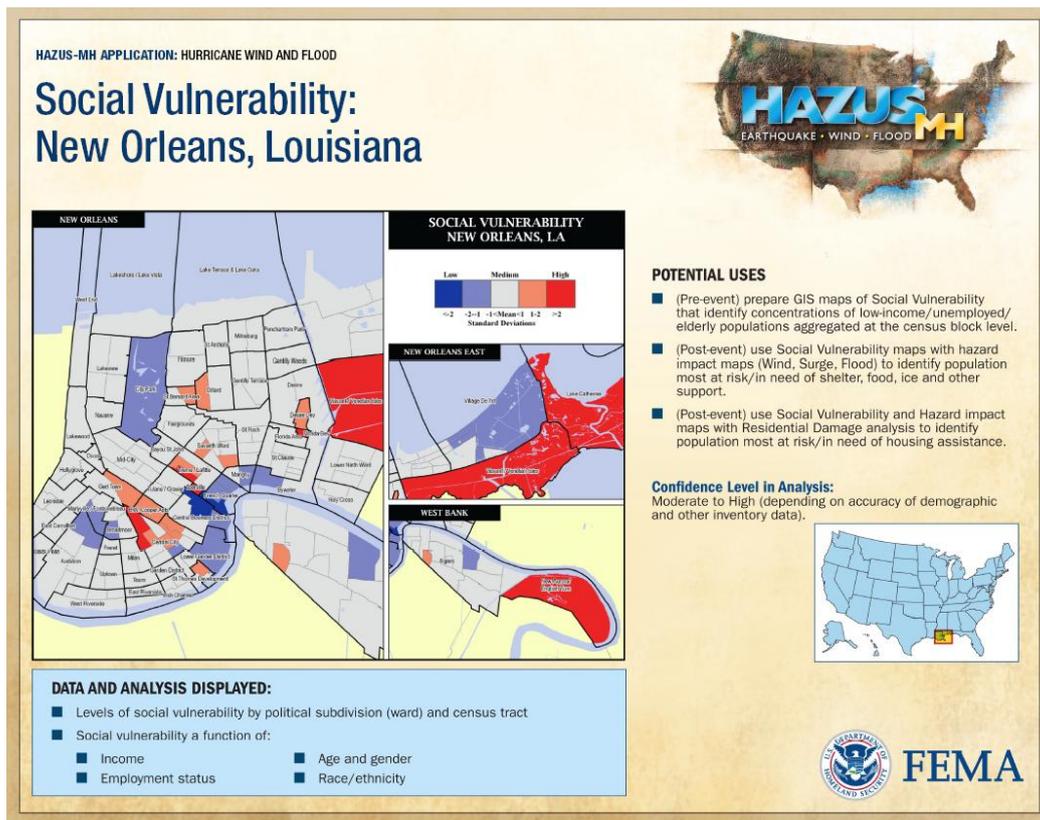


Figure 6.2: FEMA’s HAZUS-MH Application using the SOVI™ approach (Federal Emergency Management Agency 2010)

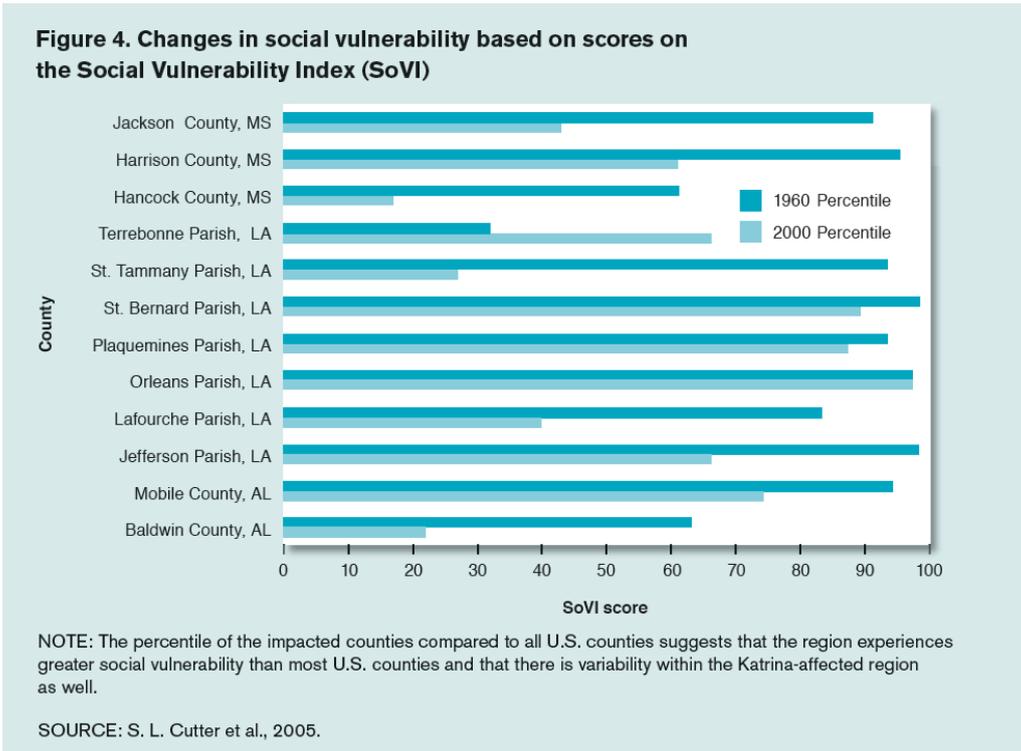


Figure 6.3: Comparison of change in SoVI of counties affected by Katrina’s storm surge (Cutter et al. 2006), Copyright (2006) Taylor & Francis Group, LLC.



Figure 4a and 4b: Screenshots from the public education video “Cries of a Hurricane.”

Courtesy of Jefferson Parish.