Organizing Hazards, Engineering Disasters? Improving the Recognition of Political-Economic Factors in the Creation of Disasters

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Disaster studies have made important progress in recognizing the unequally distributed consequences of disasters, but there has been less progress in analyzing social factors that help create "natural" disasters. Even well-known patterns of hazard-creation tend to be interpreted generically – as representing "economic development" or "capitalism" – rather than through focusing on the more specific dynamics involved. We illustrate this point with two recent and well-known cases of flooding – those in the upper Mississippi River Valley and in the Katrina-related devastation of New Orleans. In the former case, damage was caused in part by building the very kinds of higher and stronger floodwalls that were shown to be inadequate in the latter. In the New Orleans case, a more important factor in the death and destruction was the excavation of a transportation canal. In both cases, and many more, the underlying causes of damage to humans as well as to the environment has involved a three-part pattern, supported by the political system – spreading the costs, concentrating the economic benefits and hiding the real risks. In very real senses, these have been floods of folly, created not just by extreme weather events, but by deadly and avoidable patterns of political-economic choices. Comparable patterns appear to deserve greater attention in other contexts, as well.

This article focuses on a pattern that is widespread both in disaster research and in environmental sociology, but that it is in need of correction in both – the tendency to see environmental damage and the worsening of hazards

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as relatively straightforward consequences of economic growth and development. We suggest that a high fraction of human hazard-creation activities qualify as "economic development" only under the definition once provided by Wilmer MacNair (1999), "A set of policies and practices designed to take money from the bottom 95% of the population and redistribute it to the top 5%."

Hazards as disparate as springtime flooding along the Mississippi River and the devastation wrought by Hurricane Katrina provide cases in point. Both tend to be seen as natural disasters – cases of nature striking humans – but both might more profitably seen as cases in which small groups of humans struck nature – doing so in ways that helped to create the subsequent human suffering. As we will illustrate, the blows to nature were carried out in the *name* of economic development, but actual economic consequences could be characterized more accurately as the removal of money from the many for the benefit of the few.

Existing Literature: Environment, Disaster and Society

As noted in previous reviews (see e.g., Buttel 1987; Freudenburg and Gramling 1989), a common pattern in environmental sociology is an emphasis on broad or macrosociological perspectives, generally reflecting the expectation that environmental preservation interests exist in an inherent conflict with overall socioeconomic development. This pattern is particularly evident among the authors identified by Buttel (1987) as the "core" of what came to be known as environmental sociology during the 1970s and 1980s – Catton, Dunlap and Schnaiberg (see e.g. Catton 1980; Schnaiberg 1980; Dunlap and Van Liere 1984). A similar orientation is evident in later work of authors such as O'Connor (1988, 1991).

Despite their many differences, all of these sociologists have emphasized the aggregate or overall impact of human economic activity on the finite "carrying capacity" of the biophysical environment. In Catton's title, for example, the concern was that humans' overall resource appetite would *Overshoot* the carrying capacity of the earth, while in the later title of Schnaiberg and Gould (1994), the environment and the economy were argued to be in *Enduring Conflict* with one another. Even when this core literature came to be challenged by newer work on "ecological modernization" (Huber 1985; Spaargaren and Mol 1992) – as well as by work on "the environmental state," "reflexive modernization" and the so-called "environmental Kuznets curve" (Frank et al. 2000; Giddens 1998; Gergel et al. 2004; but see also Buttel 2000) – the emphasis was still on overall or aggregate relationships between economic activity and environmental harm (Fisher and Freudenburg 2004; Mol and Buttel 2002).

This macro-level or undifferentiated approach began to be challenged during the late 1980s and the 1990s by research on environmental justice (see especially Commission for Racial Justice 1987; Bullard 1994). Environmental justice research inspired strong disagreement at first (Anderton et al. 1994; Mohai 1995), but subsequent analyses have generally confirmed the conclusions from the early pioneers in the field: At least within the United States, human *consequences* of environmental harm have generally been shown to be unequal and non-random, with exposure to harm clearly being a function of race as well as income (Bullard 2008; Mohai 2008).

By contrast, only in more recent years have researchers begun to ask whether the *causes* of environmental harm might be similarly non-random. Relatively few studies have been done to date, but those studies have found the production of actual pollution and other environmental effects to be strongly disproportionate to economic significance (Szasz et al. 1993; Bishop and Stedman 1996; Freudenburg and Nowak 2000; Nowak and Cabot 2004; Freudenburg 2005, 2006; Kaldany 2006; Nowak et al. 2006; Terada 2007; Berry 2008). In considering toxic emissions from the U.S. economy, for example, Freudenburg (2005) found that the majority of all toxic emissions in the United States came from less than 5 percent of economic activity – a pattern that Terada (2007) has since reported to be similar for Japan. More detailed analyses have found still-higher levels of disproportionality between environmental and economic effects, *even within relatively specific industries* – including America's most environmentally damaging industries (Freudenburg 2005; Nowak et al. 2006; Berry 2008).

The literature on hazards and disasters has shown a similar pattern of evolution across time. As noted in the succinct summary by Bradshaw and Trainor (2007:93), "[A]lthough issues of inequality and stratification have been raised within the disaster context, it is only within the past decade that these issues have been treated more systematically." Instead, earlier work on natural disasters focused on issues such as emergency preparedness, community organization, or the restoration of services and "normalcy" after seriously disruptive events (Barton 1970; Dynes 1993; Mileti 1999; Drabek 1986).

The first exception to this pattern appears to have come with the study of a hurricane – Audrey – by Bates et al. (1963), who found the lives of working-class victims to be disrupted more seriously than the lives of people from middle- and upper-class backgrounds. Still, that study remained a relatively isolated exception to the more generic focus of most disaster researchers for the next several decades. Studies focusing on community leaders, for example, have tended to find that leaders report the long-term effects of natural disasters to have been modest or even

beneficial – so much so that Drabek (1986) suggested the appropriate way to think about disaster consequences is in terms of an "amplified rebound." (See also Friesema et al. 1979; Kreps 1989; Mileti et al. 1975; Sterling et al. 1977; Quarantelli 1985; but see also Melick 1985.)

Studies that have explicitly considered stratification issues, by contrast, have often found that disasters worsen pre-existing inequalities, amplifying the challenges faced by those in vulnerable social categories of class, race, gender and ethnicity (Barnshaw 2005; Barnshaw and Trainor 2007; Bolin and Bolton 1986; Peacock et al. 1997). Recent research, for example, finds that lower-income women often experience persistent post-disaster housing and job displacement, increased domestic violence and reduced access to schooling for their children (Fothergill 2004; Peek and Fothergill 2006, forthcoming).

In some respects, the separation between studies of overall effects vs. more specific patterns of disruption has continued to the present. On the one hand, post-Katrina demographic analyses have concluded that age, rather than race, might have been the most powerful predictor of the likelihood of dying from Katrina (Logan 2006; Sharkey 2007). On the other hand, rates of return and recovery have been far lower for black former residents of New Orleans than white ones (Baxter et al. 2008), and researchers such as Barnshaw and Trainor (2007) have argued that the broader and longer-term consequences of the disaster were to worsen the racial and class inequalities that were already severe.

Notably, however – as with the environmental sociology literature – disaster studies have still done relatively little to follow up on the political-economic dimensions of what Mileti (1999) called *Disasters by Design*, analyzing the systematic ways in which unequal power might influence the *creation* of suffering and harm. Still, the relative lack of attention to human causes of disasters has increasingly been called into question in recent years. In the epilogue to *The Sociology of Katrina* (Brunsma et al. 2007), for example, Clarke argues (2007:93-94), "It may be that we've over-concentrated on how people, groups and organizations respond to hazards. We need a lot more attention on what creates the conditions that lead to calamity in the first place." In particular, Clarke has indicated elsewhere (2006) that one of the factors contributing to *Worst Cases* can be population concentration, particularly in locations such as New Orleans – or as will be argued later in this paper, the floodplains around St. Louis – that are known to be vulnerable. Similarly, Perrow (2007) argues for more attention to the fact that populations have come to be concentrated in hazardous regions, suggesting the need to pay more attention to "shrinking the target," or spreading out the population that may be at risk. Yet it is also possible to find useful guidance from far older contributions to disaster studies.

Hewitt (1983), notably, long ago criticized what had come to be "the dominant view" in disaster research, namely that "natural hazards" such as floods and fires only become "disasters" when they happen to strike humans, who tend to be seen as (relatively) innocent victims. As Hewitt noted, however, we have known for centuries that hurricanes lash the U.S. Gulf Coast, for example, while fires and earthquakes are facts of life along the West Coast: "Most natural disasters … are *characteristic* rather than accidental features of the places and societies where they occur." (Hewitt 1983:25) From Hewitt's perspective, what is remarkable is not that nature might suddenly send an *un*predictable event to such a hapless location, but that the language of "the dominant view" would reflect such a perspective, even though humans have been building homes in regions where hurricanes, earthquakes, fires or other hazards, are utterly *predictable*.

After examining these linguistic choices, Hewitt concluded that they reflect an uncomfortable, underlying problem. One of the reasons why scientific and technological systems usually enjoy widespread support is that they permit the impression of (human) control, but disasters remind us that our "control" over nature is limited and fallible. Part of the job of so-called "responsible officials" or "disaster managers," from this perspective, may thus be to carry out rituals of reporting that "the disaster has ended" and that conditions are returning to normal, helping recognition of our fallibility to recede into the background noise – but also effectively helping us ignore the ongoing potential for disasters.

Decades before Hewitt, moreover, another noted geographer – the man often seen as the father of hazards research, Gilbert White – documented a previously unrecognized problem. As part of his dissertation research, White found that, the more the United States spent on "flood protection" projects, such as floodwalls and levees, the *higher* were the subsequent costs of flood damage. Even after controlling for inflation, this pattern did not end after White pointed it out; indeed, the costs of Katrina, now variously estimated in the range of $100-$200 billion, will guarantee that the same pattern will continue at least into the early years of the 21st Century (see White 1945; for updates, see Schildgen 1999; Pinter 2005; Gertz 2008).

Some of the reasons were easy enough to understand, with three being particularly widely noted. First, levees and floodwalls are imperfect. An old joke is that there are only two types of levees – those that *have* leaked and those that *will* leak – and a more precise estimate from the National Research Council (1982) is that levee failures are responsible for roughly a third of all flood disasters in the United States. Second, people often miss this point, expecting floodwalls to provide adequate protection from flooding. Third, as the U.S. General Accounting Office (1995) put it, "levees increase flood levels." In low-lying areas, such as the coastal deltas of Louisiana and California, levees dry out the formerly

"high" lands that they are designed to "protect," as well as cutting off those lands from future sediment deposits, meaning that lands on the "protected" side of the levee are likely to settle and sink. In regions that are not so low and flat, such as the upper Mississippi valley, building a levee to protect one part of the floodplain will mean that any floodwaters need to go someplace else. The net effect is that even strong floodwalls can exacerbate dangers, moving them to other areas, nearby or downstream, where walls are not as strong or as high. Other nations, such as the Netherlands, have been far more successful in reducing floods by leaving "room for the rivers." (Silva et al. 2001)

The pattern identified by White is known in the hazards community as the "levee effect," but the vulnerabilities are actually created not by the levees themselves. Instead, they are created by human and social factors, which are present across many kinds of environmentally (and economically) damaging construction projects – not just levees. Given the importance of levees and flooding for social science understanding of this point, however, we will focus in the pages that follow on the two most serious cases of flooding thus far in the 21st century in the United States – those in the middle stretches of the Mississippi River valley in 2008 and at the lower end of the Mississippi, in New Orleans, in conjunction with Hurricane Katrina in 2005. As will be seen, the so-called "economic development" projects in the first case did involve levees, while the key project in the second case was a transportation canal. In both cases, as we will show, the economic as well as the environmental damage appears to have been due at least as much to the ways in which our policies are constructed as the ways in which the physical projects were built.

Floods of Folly?

The first of the two cases to be examined here involves the Mississippi River flooding, which initially seems to resemble the pattern that White first identified. A useful starting point is to consider the 2008 flooding along the Mississippi in the context of 1993 floods, which were some of the most destructive in the history of the Mississippi River Basin. The 1993 floods led to the evacuation of more than 70,000 people, the loss of dozens of lives, damage to 50,000 homes, and a total of more than $15 billion in property losses (Pinter 2005; Gertz 2008).

As often happens, there were extensive calls for reform in the immediate aftermath of the 1993 disasters (see Freudenburg 1992; Pinter 2005). The Federal Emergency Management Agency, or FEMA – headed at the time by a man with extensive disaster-management experience, James Lee Witt – took the calls seriously, even responding to the kinds of concerns that would later be offered by Clarke and Perrow. The federal government,

led by FEMA, significantly reduced the size of the "target," buying, razing and/or moving more than 12,000 homes, at a cost of more than $150 million. Gertz (2008) said that "It may have been the greatest exodus of Americans from floodplain homes and businesses in the nation's history."

Unfortunately, the *overall* pattern was something other than an "exodus." By 2005, those same floodplains had become the location of some 28,000 *additional* homes in the St. Louis metro area alone – more than twice as many new homes as FEMA had managed to remove from the entire floodplain in the previous decade. The new homes were accompanied by strip malls, office and industrial parks, putting more than $2 billion of new investments – and flood-exacerbating impervious surfaces – on what had been thousands of acres of flood-absorbing bottom lands that had been under 10-15 feet of water in the 1993 floods. The new developments amounted to more building in the floodplain than had occurred in the entire previous history of the state (Pinter 2005; Gertz 2008).

According to a number of economists with whom we have discussed this pattern, what took place in the Mississippi River valley was the capturing of "rents" – defined by the noted economist David Ricardo, near the start of the 19th century, as the economic advantages obtained by using a site for its most productive use, as in the advantages of being able to raise crops on the richest of soils rather than those that are merely average, or as in converting that farmland into the location for a new interstate highway interchange. From such a perspective, levee protection has made these specific locations more valuable, and the developers who put thousands of homes and billions of dollars worth of investments into those low-lying lands were simply being rational investors.

Over time, however, "rents" have come to have a more generic meaning, and economists have come to be more critical of what Krueger (1974; see also Tullock 1967) has called "rent-*seeking.*" The term can apply to anything from the income an official derives from bribes to the profits that come from selling illegal drugs, but in this context, it refers to a different set of profits that are anything but productive – the profits that result from government expenditures that make land more valuable to special interests, even if such expenditures create substantial costs for society as a whole. These activities, in short, clearly reflect not "market" forces, but the manipulation of political forces. Schildgen (1999), for example, reports that at least 40 federal programs and agencies effectively encourage development on floodplains and wetlands, through everything from highway construction to farm export policy. In his assessment, "The U.S. government does more to promote floods than any other entity." It would also be difficult to conclude that the floodplain development is consistent with common economic assumptions about equal access to information, although additional information is helpful for illustrating that point.

The Evil Umpire?

Technically, floodplain development in the United States is controlled by regulations, but in the presence of economic and political interests, the devil is in the details. The Corps of Engineers regulates wetlands under the Clean Water Act, but the key regulations are FEMA's guidelines for the National Flood Insurance Program. Those guidelines allow nearly unlimited development, even in floodplains, if developed areas are "protected" by levees or raised up enough to be higher than the previously calculated levels of 100-year floods. At that point, FEMA effectively removes such areas from official flood-hazard maps.

Technically, so-called "100-year floods" are those that, based on previous experience, are estimated to have a 1 percent chance of occurring in a given year. Unfortunately, such floods tend in practice to occur far more frequently, partly because levees tend to worsen the flooding. Along the middle of the Misssissippi River, for example, Gertz (2008) reports there have been approximately seven "100-year" floods in the past 100 years.

Still, it is the "official" rather than the "statistically believable" 100-year floodplain that will determine where development is legally allowed. After an area has been declared by FEMA to enjoy "100-year" protection – even if the statistically believable period of "protection" today is more like 15 years, and even if this brief period is likely to shrink further because of global warming (Pinter 2005) – real estate developers may be under no obligation to inform the people buying new homes and businesses in these areas that they are buying hazards at the same time. Instead, the developers are protected by a politically legitimated process that has three key components – spreading the costs, concentrating the benefits and hiding the risks.

The *spreading of costs* is already evident in White's work on "the levee effect" or the work of Tullock and Krueger on "rent-seeking." All levels of government, and hence taxpayers, have incurred growing costs for building the very kinds of flood "protection" that have repeatedly been shown to *increase* overall flood risks and damage. The costs of suffering are being spread out as well, affecting the unsuspecting victims of later floods, as well as taxpayers, who incur further costs for rescues, cleanup, "recovery" and more. The *concentrating of benefits* is obvious, as well, with profits going to the very developers who made money by building in the floodplains. The *hiding of risks*, on the other hand, requires further discussion.

A useful starting point is Stone's approach to the analysis of power (1980, 1989), which focuses not just on the usual two sets of parties – winners and losers, or sellers and buyers – but three. Key third parties are government agencies, which often help the winners avoid any direct contact with victims, as well as helping to shape and distribute the ultimate outcomes. The governmental actors of interest specifically include local officials, identified

long ago by Molotch (1976) as being particularly interested in attracting growth, in avoiding "needless" regulations and in assisting the process of turning a city into a "Growth Machine." (see also Logan and Molotch 1987)

The Circular Liability Crisis

From this perspective, the key to huge profits from building on and selling land that is highly susceptible to hazards is a "liability crisis" – but a different kind of crisis than has received attention to date. The crisis involves a circular evasion of responsibility. Those who are harmed by the actions of others have virtually no hope, legally speaking, of obtaining liability settlements from developers who put their homes in harm's way in the first place. Aside from the fact that many of those developers could be retired or even deceased by the time the floodwaters pour in, they will be protected from liability by legal walls that are much closer to being watertight than are the levees.

The details can be complex, but the basic pattern is simple: Local governments, not developers, bear the primary responsibility for protecting public welfare. After local officials approve a development plan, the victims of floods – and of deeply flawed decision making – have virtually no legal recourse against the developers. They will need to sue city hall.

Local officials, in turn, will report that they are not supposed to be experts on hydrology. Instead, they commonly argue that they should be presumed to have acted responsibly if they relied on FEMA's official "100-year" flood maps. FEMA, in turn, can argue that "everyone knows" its floodplain maps to be imperfect, but that the agency does not have the money or other resources to re-do the nation's flood maps. The agency thus passes the blame to Congress, claiming that Congress has consistently failed to provide enough funding for the job.

Congress, meanwhile, seems able to continue finding funds for new levees, dams, canals and other "pork barrel" water projects, but not for re-doing the flood maps – even though improved maps would save billions of taxpayer dollars in avoided flood damage. One possible reason is that, despite repeated Congressional statements of concern over "high taxes," the pork-barrel projects are often highly desired by growth-machine proponents, while better maps might increase the difficulty of "developing" hazard-prone floodplains. To complete the circular displacement of responsibility and liability, finally, Congress long ago passed legislation (the Flood Control Act of 1928) that prevents flood victims from suing the federal government over any shortcomings in "flood protection" projects (O'Donnell 2008). In the end, much of the cost and blame will effectively return to the victims, who are accused of carrying too little insurance, even though the danger to their homes may be significantly greater than indicated in official floodplain maps (White 1986).

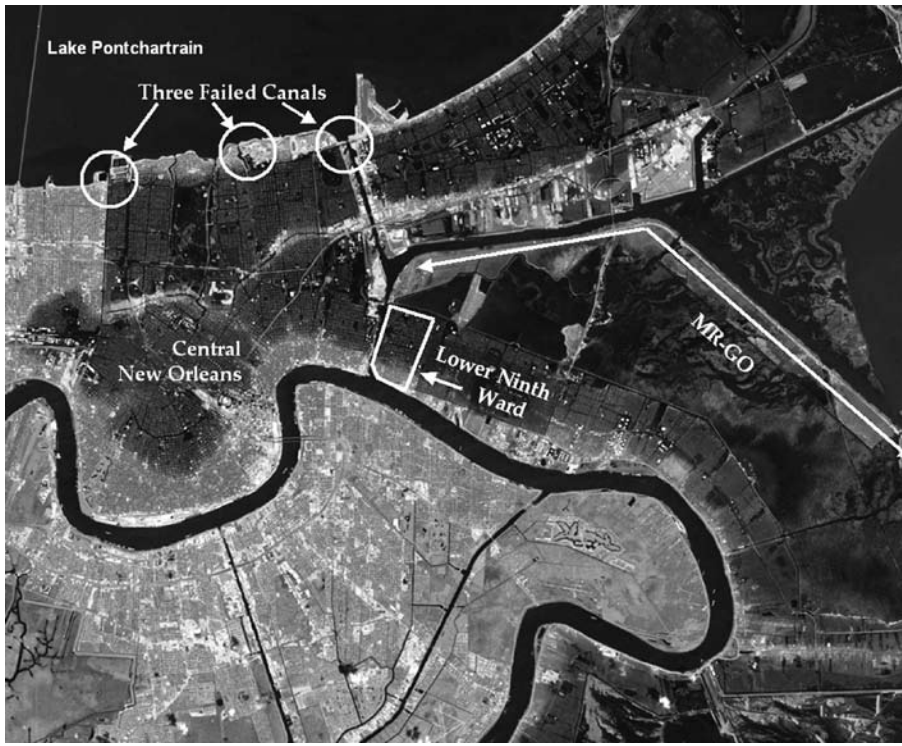
America's Worst "Natural" Disaster?

In comparison with the Mississippi River floods of 1993 and 2008, Hurricane Katrina received substantially more media coverage. Katrina was a powerful storm – the fourth-most-intense Atlantic hurricane on record, creating a significant natural disaster for southeastern Louisiana and the Mississippi Gulf Coast. The Mississippi coast suffered particularly severe damage, including the destruction of 68,729 houses (Ripley 2006). For New Orleans itself, however, Katrina is better-understood as having been an "Un-Natural" Disaster.

As Katrina made landfall, the media reported that the city had escaped major flooding, but these reports were wrong by the time they were issued. Even before the hurricane passed New Orleans at roughly 9 a.m., Aug. 29, 2005, floodwalls along several canals had already begun to fail. Over the next several days, FEMA's organizational responses failed even more severely. Less well-known, though, are other ways in which federal actions had already shaped the region's risks before the building of the floodwalls. The relevant information is presented in greater detail in other recent publications (see especially Freudenburg et al. 2007, 2008, forthcoming; Gramling et al. 2007), but a useful starting point involves a widely reported fact that has nevertheless escaped notice in most analyses to date. The three canals that caused the most important flooding – those known locally as the London Avenue, 17th Street and Industrial canals – all had floodwalls of roughly equal elevations, and as can be seen from Figure 1. All connect directly to Lake Pontchartrain, the brackish water body to the north of New Orleans that connects to the Gulf of Mexico. From the start, the Corps of Engineers claimed that the flooding came from Lake Pontchartrain (Vartabedian and Pae 2005), meaning that water should have been roughly equal in depth across the three canals. In reality, however, the water never rose within 5 to 8 feet of the tops of the walls of the London Avenue and 17th Street Canals. On the third – the Industrial Canal, which borders the predominantly black Lower Ninth Ward – water surged well over the top (for extensive discussion and photographic evidence, see Freudenburg et al. 2007, 2008). That simply could not have happened if the explanations from the Corps had been correct.

To understand why rising water should have behaved so differently in the three canals, it is helpful to start significantly earlier – and to consider another comparison. Katrina was by no means the first major hurricane to deliver a relatively direct hit to New Orleans. In particular, two other major storms came within a few miles of taking the same track – Hurricanes Betsy and Camille, in 1965 and 1969, respectively. By a number of measures, both of the earlier storms "should" have created about as much damage to the city as Katrina. In practice, that was not the case. Both of them did create

Figure 1. Flooded Areas of New Orleans, Sept. 7, 2005, showing Three Failed Canals – the 17th Street, London Avenue and Industrial Canals



Note: Darker areas were still flooded when this satellite image was taken, nine days after the storm. Note that all three of the failed canals connect directly to Lake Pontchartrain (circled locations) and should thus have had similar water levels if flooding came from that Lake. Image © CNES 2*** Distributed by Terra Image USA, LLC and Spot Image.

some flooding, with Hurricane Betsy, in particular, flooding about 25 percent of New Orleans and killed 76 Louisiana residents. Betsy also inspired what the Army Corps of Engineers called "The Hurricane Protection Program" – the building of levees and floodwalls that failed to protect the city from Katrina, but that were nevertheless significantly taller and stronger than the ones in place in 1965. Despite the improved protection, however, Katrina flooded 80 percent of the city, killing 20 times as many people as Betsy. Something besides the building of floodwalls must have happened between 1965 and 2005 – and as we will discuss in the following pages, perhaps the most important such changes involved the loss of wetlands.

As recently as 1960, Louisiana still had the vast majority of the wetlands that greeted the earliest French explorers. During the four decades between

Betsy and Katrina, however, Louisiana lost more of its wetlands than had disappeared in the previous four centuries – about 1,700 square miles, or more than one million of its four million acres (Barrass et al. 2003). For context, that is an area roughly as large as Delaware. In recent years, land has been disappearing at the rate of more than 30 square miles – more land than Manhattan Island – every year (U.S. Geological Survey 2006; see also Louisiana Coastal Wetlands Conservation and Restoration Task Force and Wetlands Conservation and Restoration Authority 1998). By the time Katrina hit, the once-thick band of wetlands was in tatters – and after Katrina hit, so was New Orleans.

Those losses, moreover, were not due to "nature." They had a range of causes, including oil and gas exploration activities in the marshes themselves, and the building of dams and levees upstream, but to the southeast of New Orleans – the direction from which Katrina's storm surge attacked the city – the key factor was a single navigation canal known as the Mississippi River Gulf Outlet, or MRGO. The canal is pronounced almost universally as "Mister Go," but at least since the time of Betsy, it has also been known locally as "the hurricane highway." (Brown 2006a; see also Day 2005) It was supposed to deliver prosperity, but it delivered disaster instead.

New Orleans has known canal-digging projects for as long as it has been inhabited by Europeans, but not until the 20th century – and perhaps not until MRGO – did the canals get large enough to create truly serious environmental damage. Although few people outside the region had heard of MRGO before Katrina struck, it was controversial in the region since it was first proposed. It was designed as a "tidewater" or sea-level navigation canal, stretching from the heart of New Orleans down to the Gulf of Mexico – a giant ditch, some 75 miles long, that parallels the last 120 serpentine miles of the Mississippi River.

For years, local growth promoters had dreamt of a canal that would make New Orleans a seaport – not simply a "river town" more than 100 miles from the Gulf. It was the development of new technologies during the construction of the Panama Canal, from 1904-1914, that offered the first real potential to realize that dream.

Initial lobbying was slowed by the Great Depression, and the quest for federal funds was not helped when the Chief of the Corps of Engineers found "no necessity for another deep-water outlet from the Mississippi River." (U.S. House of Representatives 1936, as quoted in U.S. House of Representatives 1951:19) During World War II, however, local boosters changed their sales pitch, arguing that the entire nation's productivity and output might suffer if an enemy were somehow to "close" the mouth of the river. Supportive representatives from the local mass media cheered them on; the *New Orleans Item*, for example, editorialized that "the port's life-line should not depend entirely upon a crooked, fog-covered,

silt-bearing, temperamental river channel, which might otherwise restrain or restrict the growth of the port of New Orleans like a Chinese girl's foot." (*New Orleans Item*, July 27, 1943, P. 21, as quoted in Azcona 2006:24)

The canal was completed to half of its official width by 1963, then widened and finally completed in 1968 (Brown 2006a; U.S. Army Corps of Engineers 2001). Hurricane Betsy – and the first depictions of MRGO as the "hurricane highway" – came midway between those two dates, in 1965.

The Corps of Engineers has always disagreed with its critics. The Corps argues that the canal played only a minor role in Betsy's damage, or Katrina's, and that the canal increased the height of Katrina's storm surge by a fraction of a foot, at most (U.S. Army Corps of Engineers 2006a). On the other hand, many citizens of the region, along with a number of independent technical analyses, point to important environmental problems that are left out of the evaluation by the Corps (Independent Levee Investigation Team 2006a, 2006b; Van Heerden and Bryan 2006; Bea 2006). What is not up for debate is that, being nearly as straight as a gun barrel, and with no fresh-water flow to keep out salt water, the "Outlet" served instead as an "inlet," allowing salt water to kill salt-sensitive plants in the wetlands that historically protected New Orleans from hurricanes.

Wetlands are important shock absorbers for hurricane storm surges, which are slowed and weakened by friction. In 1963, the U.S. Army Corps of Engineers, itself, estimated that a band of coastal wetlands 2.7 miles wide could lower a storm surge by a foot. Later calculations indicate that cypress trees, which are strong and well-rooted, can greatly increase the protection, reducing storm surges nearly three times as effectively (U.S. Army Corps of Engineers 1963; van Heerden 2006; Robinson and Newton-Small 2006).

Unfortunately, the wetlands to the southeast of New Orleans, and the cypress trees in particular, were devastated by MRGO. The fragile wetland soils removed by the Corps during the original excavation – more dirt than needed to be removed for digging the Panama Canal – merely started a vicious cycle. At Shell Beach, about half-way up the "outlet," salinity more than tripled soon after excavation reached the Gulf, quickly reaching cypress-killing levels (Kerlin 1979; Caffey and Leblanc 2002).

By the end of the century, the Corps of Engineers (1999) concluded that MRGO had contributed to turning 11,000 acres of fresh or intermediate marshes and cypress swamps into brackish or partially salty marshes. Just as critics feared, moreover, with plants no longer holding the soil, surrounding wetlands would slump into the channel – after which the Corps would dredge the channel, yet again, after which more salt water would destroy still more plant life. All in all, depending of the estimate being used, MRGO has helped to destroy 20,000-65,000 acres of wetlands – as much as 100 of the 500 square miles of the wetlands that previously stood to the southeast of New Orleans – the very direction from which

Katrina's storm surge would attack the city. The water that surged over the floodwalls of the Industrial Canal and wreaked havoc on the Lower 9th Ward came directly across this area of formerly healthy wetlands.

"Economic Survival," Real and Imagined

In the aftermath of Katrina, one of many complaints was that the federal government had not provided enough money to build all of the flood protection projects that were needed. At least that charge, however, appears misdirected: In the five years prior to the hurricane, Louisiana actually received far more money for Corps civil works projects than any other state – about $1.9 billion in all, well ahead of $1.4 billion for second-place California, with a population more than seven times as large and a coastline three times as long. Instead, the state's leaders usually "invested" in projects that were supposedly intended to help the region's economy, not its safety. Former Louisiana Sen. John Breaux, for example, said that "We thought all the projects were important – not just levees." Although "hindsight" might have pointed to different priorities, he said, "navigation projects were critical to our economic survival." (Grunwald 2005)

As noted in the opening sections of this article, prevailing patterns in sociological analyses of environmental problems do tend to concur with the Senator's argument in one key respect – they generally expect that environmentally damaging projects such as MRGO must be "critical for economic survival" or for broader capitalistic development. The most influential assessments tend to see what Schnaiberg and Gould (1994) have called an *Enduring Conflict* between economic prosperity and environmental preservation, or what O'Connor (1988, 1991) called "the second contradiction of capitalism." However, we believe it is important to examine the specifics, that is, particularly in the case of the most environmentally devastating projects, it is important to treat expectations or claims about economic benefits as being testable hypotheses.

In fact, traffic on MRGO never matched the official forecasts by the Corps – to say nothing of the still-more-enthusiastic claims by local boosters – and despite ever-increasing expenditures for dredging, actual shipping volumes ultimately dropped over time. The total taxpayer "investment" in MRGO may never be tallied with certainty, but a reasonably conservative estimate for the initial construction cost, not including the ongoing dredging, would be $200 million or more (Freudenburg et al. forthcoming). The additional, ongoing dredging costs are far easier to track: Even if we look only at fiscal year 2004 (the last full year before Katrina, ending Sept. 30, 2004), U.S. taxpayers spent an additional $19.1 million to dredge MRGO once more (Camillo 2008) – all so that, during the full calendar year of 2004, the channel would be used for only about a dozen round trips by ships that actually required the dredging (U.S. Army

Corps of Engineers 2006b). The actual level of taxpayer subsidy that went to the relatively few direct beneficiaries of MRGO – namely a small number of businesses and presumably their employees – thus amounted to more than $1.5 million per round trip, or more than $10,000 per ship mile. That estimate, moreover, ignores the additional costs to the marshes, to say nothing of the costs to the citizens who lost their homes and/or their lives through MRGO-exacerbated flooding.

Under basic principles from Economics 101 – specifically including the fact that such heavy subsidies *reduce* economic efficiency and hence economic growth – it would be difficult to argue that this environmentally destructive project could be seen as *helping* economic growth, or capitalism writ large. The supposed "investments" in maintaining MRGO – to say nothing of the costs of building it in the first place – far outweighed the profit from, or even the total value of, the cargoes on some of those ships. The ongoing dredging may have been deadly for the marshes – and for the citizens of New Orleans whom the marshes formerly protected – but that did not mean that they were thus somehow good for capitalism or the American economy. The only economic return on the investment was that MRGO carried less than half of a single percent of southern Louisiana's water-borne cargo that year, while the "crooked, fog-covered, silt-bearing, temperamental" Mississippi River carried more than 250 times as much freight (U.S. Army Corps of Engineers 2006b; Gramling et al. 2007).

Discussion: Disasters or Tragedies?

Along the Gulf Coast to the east of New Orleans, Katrina can legitimately be seen as a natural disaster. In New Orleans, Katrina might more appropriately be seen as a tragedy. Much the same is true of the 2008 flooding along the Mississippi River.

Even the word "disaster" has connections to past ways of thinking. It comes from *dis* + *astro*, or "bad star" – origins that come from astrology, rather than science, or for that matter, from any (recognized) human responsibilities. By contrast, as defined by Aristotle, a "tragedy" results from a mistake, or more specifically, the hubris, of a great or powerful person. In ancient Greece, *hubris* referred to needlessly causing shame or humiliation – actions such as mutilating the corpse of a vanquished opponent – but the word is now applied to any outrageous act or exhibition of excessive pride.

Clarke (2006) has written eloquently about the role of hubris in creating *Worst Cases*, and the kind of damage that MRGO did to the Louisiana wetlands can certainly be compared to mutilation, but the metaphor is imperfect. In Aristotle's "tragic" pattern, the hubris of the great person led ultimately to that person's *own* tragic downfall, rather than to suffering bothers.

By contrast, in post-Katrina New Orleans and in communities that have suffered levee-caused flooding, what appears to be emerging is a modern variation on Aristotle's vision – a triple tragedy. First, the hubris of a number of "great" or at least politically powerful people unleashes serious environmental harm. Second, that environmental harm worsens "natural" hazards, bringing damage to humans *and* the economy. It is the third of the more modern tragedies, however, that may be the most notable: in many if not most cases, the suffering is done not by those who initiated the cycle of harm, but by others – particularly those who are least able to protect themselves from it. If the ancient Greeks believed that the gods would punish those who deserved it, providing a form of justice, the modern and essentially godless variant is essentially the opposite. The punishment for the hubris of the politically connected few is delivered to the many, nearby, who are little more than innocent bystanders. It is a pattern that has been largely overlooked in the disaster literature in the past, but it is one that deserves more attention in the years ahead.

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